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The Farmer's Digest

From more than two hundred magazines and bulletins published in this country and abroad, the Editorial Staff of the Farmer's Digest selects articles of outstanding merit and general interest. It is comprehensive in its scope, covering all phases of Agriculture.

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The Farmer's Digest

Vol. 3 June, 1939 No. 2

Our Breed Associations

Condensed from Successful Farming

V. A. Rice

Massachusetts State College

WE have made remarkable progress in animal breeding in the United States since the days of the early settlers. Tough, wiry, streamlined longhorns have been largely replaced by blocky, low-set, high-quality bullocks; our sheep have three or four times as much wool spread over a much more desirable carcass; our hogs are more prolific, more efficient and speedier converters of grass and corn; our horses heavier and better fitted in every way to relieve the physical burdens of food-production; and our dairy cattle produce a greater quantity of a higher-quality product than they did in Pilgrim days, in Civil War days, or even in World War days. In this march of progress our breed associations have had a most prominent part. That they have tended to be a bit conservative is probably a good thing.

A breed association is a group of men banded together for the pedigreeing, protection, and promotion of their particular breed. Most of these associations were organized after the year 1875, making them less than 75 years old at the present time. That they have accomplished great good no one acquainted with the facts would for one moment doubt. Like all things human, however, they have had and still have their failings. After 75 years of effort, and since they are recording societies, they should, it would seem, have records to which a breeder could turn for fairly accurate guidance in his job of breeding better livestock. They should now, in other words, be a real help to breeders because they were organized for that purpose alone and long enough ago for results to have been achieved.

The greatest "lack" in breed associations today is the lack of records of performance. A pedi-

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gree which consists merely of names of ancestors without production performance of the ancestors is of little value. If, however, the pedigree could be made complete in terms of records or characteristics, it would be an invaluable guide in the selective mating of animals. For example, if you have brown eyes, and your parents, grandparents, great grandparents, brothers, sisters, cousins, aunts, and uncles all had brown eyes, then we would be reasonably safe in assuming that you would transmit only brown eyes to your children. In livestock, substitute for brown eyes such characteristics as hams, wool characters, loins, rounds, size of litters, efficiency of feed conversion or fattening, and so on. Before we can hope for further progress in livestock-breeding, a way must be found to get records of such performance characteristics on our breeding animals.

The United States Department of Agriculture, in co-operation with state colleges of agriculture, inaugurated surveys in 1936 seeking to discover superior breeding animals backed by adequate records. In beef and dual-purpose cattle the 48 state colleges and experiment stations were able to furnish practically no data that might be useful in locating superior breeding stock. They were asked also to submit the names of breeders who might have such superior stock, and for the whole of the United States 11 stations furnished the names of 64 men—who were not surveyed because of the small likelihood of getting any data of real value. It was the same story in swine altho several stations are carrying on research projects dealing with the inheritance of characters of outstanding economic importance. "Because of the lack of results from the survey of experiment-station herds, contacts with owners of private herds were postponed." It was the same general story all over again with sheep and horses: no records anywhere to prove breeding worth. In dairy cattle more tangible results were secured from the state colleges and experiment stations, and the survey extended to dairy-cattle breeders. In all, 1,097 herds were listed and 708 herds in 40 states were included in the final summary. A total of 4,309 sires in seven breeds were found whose daughters' production could be compared to that of their dams. These bulls were bred to about 30,000 cows whose production averaged 452 pounds of butterfat—the resulting daughters averaged 451 pounds of butterfat and these, remember, are the selected best herds in the country. One farm, after using more than a dozen bulls over a 35-year period, ended with approximately the same production it started with.

The first stage of our animal husbandry in America was the introduction and mating of cattle, sheep, swine, and horses by the early settlers. There were no breeds in those early days, just animals. Most of our breeds arose in England, Europe, and America largely during the 19th century and largely, be it noted, thru inbreeding to intensify desirable characteristics and labels (black for Angus, black and white for Holsteins, red for Durocs, and so on). Along with this came the formation of breed associations to record pedigrees, to protect the purity of and promote the use of various breeds. Standards of perfection were set up and the breeds gradually approached the standard by the simple process of weeding out those animals which failed to approximate the breed standards. It was early realized that some animals that were themselves good representatives of the breed lacked the ability to transmit their own desirable qualities. By and large, however, the purebreds were better individuals and better transmitters than grades or scrubs.

This led to the second stage in American animal husbandry, the use of purebred sires for grading up native or grade herds. The demand for purebreds and the lack of rigid criteria for measuring breeding worth led to the use of many poor purebreds as breeders —to the detriment of animal husbandry in general and the breed in particular. The worst feature of a poor sire from either the breed's or the individual breeder's standpoint is the fact that if he is used the harm does not stop with him but breeds on for many generations. The contribution of purebred sires on the whole to our American animal husbandry, tho, is beyond calculation. While some bad sires have been used, the total effect in better loins, rounds, hams, legs, backs, wool, milk, and power, is both enormous and well recognized. The breed associations have been great promoters and they have performed their function in this second stage of animal development with marked success.

The third stage, that of getting more complete and accurate production records so that animals may be proved for breeding value, lies in the future, and time alone can tell how well the breed associations will respond to this responsibility. Up to the present they have done little or nothing. They have worked hard to *preserve the purity* of their respective breeds thru recording genealogies, and also to *promote the use* and increase of their breeds. True, the dairy breeds have had their Advanced Registry work for nearly 40 years. Altho it represented a considerable advance over the old, recordless days, its

value should be apparent after this lapse of time so that we could now write to a breed secretary and find out just where we could buy a bull that, when mated to a herd of cows of some known production level, would leave a group of daughters of some certain higher production. Ever try it? This does not imply that the secretary would be acting as sales agent for some particular breeder or group of breeders, but rather that the breed had secured facts regarding the transmitting abilities of animals in their respective breeds and had published the facts for breeders and buyers to use as they see fit. And before you criticize the secretary, you should call to mind the fact that he is simply a person hired to carry out the desires of the breeders as expressed thru the breed's executive committee or board of directors.

The value of Advanced Registry work, from a breed-improvement standpoint, has been negligible or worse. Thousands of excellent records have been made and many animals have been sold at long prices because of them, but we know now that an individual's performance and its progeny may be as unlike as day and night. No, selective testing is not worth the money it costs because it gives a distorted picture of the facts. The poorest bull that ever lived would probably have sired a few good daughters out of really good cows.

The herd test is a lot more satisfactory (records on all animals in a herd year after year), and such testing is now available in all the dairy breeds. Its use should be pushed much harder than is generally being done and at the same time selective testing should be discouraged. Then, after the records are secured, they should be made readily available to breeders in a form that they can use in selecting breeding stock. The best way is on the basis of a comparison of the daughters' records with those of their dams. One breed does this. Some of the others lump them in with A. R. records so that one needs the patience of Job and the ingenuity of a Philadelphia lawyer to dig out the material and to get it into some workable, usable shape. One breed is now four years behind in the assembling of its herd-test records.

A fine system of recording D. H. I. Association records and getting valuable data quickly into the hands of the breeder has been set up by the Bureau of Dairy Industry, in co-operation with state colleges. If a bull is being used in a D. H. I. herd we can write to our state extension dairy specialist and get the breeding facts about the bull as soon as he has five daughters with records from dams with records, as these

facts are published twice yearly. The writer, nevertheless, believes that there is some danger in this set-up because he does not believe that five daughter-dam comparisons are enough to prove a bull; in fact, he would demand twice this number. And, too, they must be an unselected, run-of-the-mine group.

It would seem that the breeds could well afford to discourage, and shortly give up entirely, selective testing, and induce their breeders to test all their cows every year in D. H. I. Associations. Then the records would go to Washington, thru the Bureau of Dairy Industry, and bulls would be proved automatically while they were still young and vigorous. This would relieve the breeds of this expensive line of activity and permit them to devote their time and energies to really worth-while things, such as preserving the purity of their respective breeds by continuing to register animals and by conducting research to find the really best strains in their breeds and disseminating these good strains as widely as possible when found.

We are badly in need of something of this sort regarding our meat animals. There are probably two reasons that we don't have it: one, the fact that we are largely appraising visible qualities in our meat animals, loins, rounds, indications of quality, and so on, rather than invisible things like milk-production (therefore the need for factual data does not seem so great); and, secondly, the difficulties involved in getting factual data. Nevertheless, some beginnings are being made. In Iowa the extension service is sponsoring a swine-herd-improvement plan. A record is kept by breeders of the number of pigs farrowed per litter, number raised to eight weeks of age, and the weight of the litter at 56 days. In this way the individual sow's worth regarding fertility and ability to suckle pigs is measured. Later, representative pigs from each litter are to be judged from the standpoint of suitability on the hoof, and then slaughtered to obtain dressing percents and cut-out values. The standards are seven pigs per litter for gilts, eight for sows; litter weights at 56 days, 225 pounds for gilts and 250 for sows.

In Minnesota a group of hog-farmers have hired a sow-tester, who travels about to secure litter data of the above sort; and a packing plant is co-operating in securing the necessary carcass data.

Two or three of the swine-record associations (namely the United Duroc Record Association and the Hampshire Swine Record Association) have already started Advanced Registries for sows and will publish lists of breeders and

their animals which have met A. R. requirements based on their records as progenitors of efficient, high-quality, pork-making machines. (The writer wishes, however, that it could be called what it actually is—"production registry.") This is indeed heartening. These breed associations soon will be able to render real service to their members.

Something of the same sort is needed in our beef herds, sheep flocks, and also with horses. The breeding principles are just the same, and the only short cut to success is the sometimes tedious keeping of records so that actual breeding worth can be ascertained by measuring specific qualities in offspring. Now that a start has been made, progress should be fairly rapid. The breeds that move ahead in this regard will have a decided edge on any which do not. And the breeder with actual records on his animals will likewise have a big jump on his competitor who lacks them.

Adequate proof that performance records can be exceedingly valuable is found in Denmark's system of progeny testing of swine. During the 30 years it has been operating, the records show that swine in Denmark have improved in rate and economy of gain, in quality of product, as well as in the proportion of higher-priced cuts which their carcasses yielded. While some of these changes are no doubt due to better feeding and management, a goodly portion is undoubtedly due to more intelligent selection of breeding stock—more intelligent, that is, because based upon actual transmitting abilities.

That there are great differences in all meat animals, both as individuals and regarding their abilities to transmit desirable qualities, hardly seems necessary to argue. Breeders have known this from time immemorial but few have kept such records as would prove the case, and even so they would be private records probably true and honest altogether, but lacking an official stamp. Experiments have demonstrated that some steers will reach marketable weights three to four months ahead of others and with great differences in amount of feed required for 100 pounds of gain. Similarly some rams have been shown to vary considerably in their ability to increase the carcass and wool qualities of their offspring over those of the dams of said offspring.

To provide stockmen with accurate breeding information, these differences should be measured by performance tests. Perhaps the breeds should do it, perhaps a disinterested party. It may be that the best solution to the problem is to have the Bureau of Animal Industry do for beef cattle, sheep, swine, and horses what

the Bureau of Dairy Industry is doing in finding and publicizing efficient, high-producing strains of dairy cattle. The individual farmer or breeder would bear the expense as he does with D. H. I. testing.

Our great need is *records to prove breeding worth*—records as to speed and economy of gains, quality of product, reproductive efficiency, amount and character of wool, longevity, resistance to disease, pulling and staying power, soundness, and so on. The job is for each class of stock to set up its own standards and to find practical, economical methods of measuring its animal population against the standards. The purebred-breeders, thru their associations, should take the lead. It is a challenge which they cannot ignore.

Repairing Tractor Tires

TRACTOR tires are big and tough, but occasionally they may be injured. It is a good stunt to give the tires an occasional going over for possible injuries. There are several types of possible injuries each of which requires different treatment.

If the side wall or tread rubber is cut through, exposing the fabric, wash the cut with gasoline and fill in with tread cut repair gum to prevent moisture and dirt working into the fabric. The abrasive action of stones and dirt, and the rotting effect of continuous moisture will break down the tire if this is not done.

Punctures caused by a large nail, or something similar, calls for taking the tire off and inserting a rubber plug in the wound from the inside. If the cord body of the tire has been broken by puncture or striking some sharp obstruction, it should receive a temporary patch at once, and have a permanent vulcanized repair job done as soon as possible to save the tire.

Removing these large, heavy tires for repair work can be hard work for the novice. Several kinds of tools are necessary, and have different uses for each kind of tire. Manufacturers have service bulletins available that simplify the procedure, give directions for the use of tire tools and how to go about taking off the tire for the greatest ease in handling this job.

—*American Poultry Journal*

Recreation in the National Forests

John Sieker

Acting Chief, Division of Recreation and Lands, Forest Service, U. S. D. A.

NATIONAL forests and national forest purchase units have been established in all States except Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, and Kansas. The forests total 158 in number and include over 175 million acres of land which is largely mountainous, relatively rugged in topography, and generally forested with fine stands of timber.

National forest land is administered by the Forest Service of the United States Department of Agriculture on the multiple use principle and one of the more important uses is public recreation. Each forest is in charge of a forest supervisor whose office is in a town close to the forest. Forest rangers live in ranger stations on the forest and have charge of a portion of the forest.

On every one of the 158 national forests there are several public camp and picnic grounds which are provided with simple conveniences and necessities for the use of campers and picnickers. These camp and picnic grounds are open to the public during the season of use, without charge, except that at some of the larger areas where there are heavy concentrations of people a nominal charge is made for special services such as cut firewood, hot showers, use of bathhouse, etc. Even on these areas, however, where special services are charged for, use of the area is free to persons who do not desire the special services.

Because of the extreme range of the national forests, scattered from Maine to California and from Washington to Florida, it is impossible to describe the facilities or the types of recreation offered, in any but a very general way. Some of the forest campgrounds are open the year round, while others are usable for only three months in the middle of the summer because of their high altitude. Some are within view of magnificent mountain scenery, at the base of snow-capped peaks, while others are sheltered in the Valley. Some camps are reached only by traveling over mountain wooded hills of the Ohio River roads and others are within a stone's throw of transcontinental highways. Camps are found in the dense spruce and pine forests

of the Great Lakes region, and also in the heart of the Arizona desert amid fantastic cacti 40 feet high, where water is obtainable only at a few places. You can camp on the national forest with the surf pounding at your feet, or at ten thousand feet elevation where the alpine flowers make the best of the short season and isolated snow banks do not entirely disappear until August, only to start piling up again in October. You can find national forest camps that receive 100,000 visits a year, or some that are used by hardly more than a few hundred solitude-loving campers.

Whether you want solitude or company, timber or desert, cold trout streams or sunny bathing beaches, you can find the spot of your heart's desire on some national forest camp or picnic ground—rugged scenery of a magnificence which takes away your breath, the quiet beauty of pine-clad hills, the cool, bracing air of New England or the hot, dry, intriguing desert of the Southwest. The hazy beauty of the Great Smokies, the astounding Black Hills, of South Dakota, rising abruptly from the surrounding prairie, the big timber of the West Coast, the thousands of lakes of Minnesota, the charming Ozarks, are all represented in the national forest family.

All forest camp and picnic grounds are located in surroundings which will best serve the desires of the people who will use them. Shade, scenery, and a forest environment are the principal values sought, but fishing, boating, hiking, and swimming facilities are also very carefully considered and are available at many areas. Forest camp and picnic grounds always provide tables, fireplaces, safe drinking water and sanitary facilities, and frequently the larger areas have community shelters, bathhouses, and children's playgrounds. The camp and picnic sites are so arranged that individual parties may have relative privacy, but if a group comes they may find sites large enough to accommodate them. In general, the sites for individual parties are over 100 feet apart and whenever possible are partially screened from each other.

Despite the many recreation activities available at these areas, such as swimming, boating, games, hiking, etc., the general atmosphere is restful and definitely sylvan. The improvements are all simple and appropriate to the forest, harmonizing as much as possible with the natural setting.

Besides camp and picnic grounds the national forests offer other forms of recreation. On many forests wild scenic back country has been set aside as wilderness areas in which the

works of man are kept at a minimum. Roads and man-made improvements are prohibited and these areas are accessible only by horseback or afoot. Here the lover of the forest can lose himself in the complete absence of artificial influences and can feel somewhat the emotions of the pioneer who blazed the first trails through the forest of the west. Saddle and pack stock are available near all wilderness areas and can be hired with a guide and packer for $1.00 to $2.00 a day per head and $5.00 a day for the packer. For small parties it is necessary to figure two horses to a person.

In recent years the Forest Service has improved many winter sports areas where snow conditions are satisfactory for skiing, snowshoeing, tobogganing, and kindred sports. The areas have abundant trails, suited to the beginner as well as the expert. These areas generally have shelters and often ski lifts to carry the skier to the top. Except for a small charge for the use of the ski lift the areas are free, and for those who prefer to walk up the slopes there is no charge. Cross country skiing on the forest is becoming more and more popular each year by those who love to get out into the forest. Many types of forest scenery are even grander in winter than in summer.

On many of the forests private companies have been permitted to build lodges and resorts so that recreationists who wish to enjoy the forest in greater comfort than camping affords may do so. These resorts are all regulated by the Forest Service so that the services and prices charged are within reason. Because of the short season of use at many of these places the prices are necessarily rather expensive, some of them running as high as $8 to $10 per day American plan, but that includes use of a saddle horse. There are, however, many other less luxurious resorts at which the rates approximate those of the small-town hotel. These privately-owned resorts offer accommodations ranging from simple cabins to rooms with every modern convenience.

Those wishing to take advantage of the recreation opportunities of the national forests should get in touch with one of the nine regional foresters in the continental United States. A letter addressed to him will bring a prompt reply to any questions about accommodations, seasons, special regulations, state game laws, or any other matters. When writing to the regional forester be sure to give your preference for certain types of recreation so that he may direct you to the camp or resort which will best suit the kind of recreation which

you want. And don't forget to give the time of your expected visit, since certain camps are delightful at one season of the year, but not so desirable at others.

Information concerning a certain section of the country is available from the regional forester who has jurisdiction over the state where the camping trip is planned. The following is a list of the regional foresters' addresses and the states in which their forests are located. If you wish general information, address the Chief, Forest Service, U. S. Department of Agriculture, Washington, D. C.

At forest camp and picnic areas it is necessary to bring along tents, bedding, cooking utensils, and food. Heavy shoes are very necessary if any hiking is planned. Small town stores are available near many but not all of the camp grounds, and those desiring to camp at the more isolated places should go well provided so that long tedious trips for provisions will not be necessary.

The game and fish on the national forests belong to the state and may be hunted or fished for only in season and by persons having a state license. State licenses are obtainable at most

Regional Forester—Missoula, Montana —*Montana, northern Idaho*

Regional Forester—Denver, Colorado —*Colorado, Nebraska, Wyoming, South Dakota*

Regional Forester—Albuquerque, N. Mex.—*New Mexico, Arizona*

Regional Forester—Ogden, Utah —*Utah, southern Idaho, Nevada, extreme west Wyoming*

Regional Forester—San Francisco, Calif.—*California*

Regional Forester—Portland, Oregon —*Washington, Oregon*

Regional Forester—Washington, D. C. —*Maine, New Hampshire, Pennsylvania, Vermont, Virginia, West Virginia, Kentucky*

Regional Forester—Atlanta, Georgia —*Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas*

Regional Forester—Milwaukee, Wis. —*Indiana, Illinois, Iowa, Michigan, Minnesota, Missouri, North Dakota, Ohio, Wisconsin*

small towns and those interested in this sport should inquire about license, season, bag limits, etc. Forest Service rangers assist the regular state game wardens in enforcing state game and fish laws.

Mountain climbing is a fascinating sport, but is one that requires experience, skill and often special equipment. Difficult peaks should be scaled only by experienced persons, and never alone.

These warnings are not intended to detract from your pleasure of exploring the national forests as much as you desire, but simply to let you know that unfamiliar country offers certain hazards which may trap the newcomer.

If you are ever lost in the woods or mountains, the main thing to do is to keep your head, conserve your energy, and find water and shelter. A man can live for days without food, but must have water and shelter. In the eastern and midwest parts of the United States, anyone can get back to civilization by following down stream, but this may not be true in the larger areas of the west. In general, if you are lost and know that your party will miss you and start a search, just walk on slowly, downhill, until you find water. The degree of shelter you need depends upon the climate. Often a large tree may do, or a cave or overhanging ledge. Build a small fire and wait for a searching party to arrive. Do not attempt to travel in a strange country after dark, especially in a rough, rocky forest country where one misstep might throw you onto rocks, into a crevice, or against dead branches of trees.

If you started alone and cannot expect to be missed for some time, should you become lost, head downstream and keep going slowly and methodically. Do not be fooled by fences in the forest. Often they are drift fences which lead no where except up to some rimrock. Sooner or later you will come to a habitation or a trail or road. Do not be misled by every trail that crosses your path; game trails and stock trails are common and frequently lead nowhere. Do not do what one midwesterner did in Wyoming—follow a cow around waiting for the farmer to get her for the night milking. Range cattle in the west are not milked at night and often spend months in the hills without being seen. Your best bet is to keep on downstream until you cross some road or a trail which is unquestionably man-made and well traveled.

The national forests are public property and are free to the nation's citizens. Each user of the forests should help protect them from damage. The Forest Service asks your co-operation by observing these simple rules:

1. Build a fire only when necessary; then build a small fire on a site near water after all inflammable material down to mineral soil has been removed from a spot five feet in diameter.
2. Before leaving a fire, even for a short time, extinguish it with water and cover the ashes with earth.
3. Do not throw away lighted matches, cigar or cigarette ends, or pipe heels. Drop them in damp mineral soil. Step on them.
4. Keep the camp clean. Where garbage pits and incinerators are not provided burn or bury all garbage and refuse.
5. Do not pollute the springs, streams or lakes by insanitary acts.
6. Do not mutilate or destroy the trees and shrubbery or the signs and improvements.
7. Do not hunt or discharge firearms in the vicinity of forest camps and habitations.
8. You are permitted to hunt and fish on national forest land unless it is specifically closed and posted against such use, but subject to the state fish and game laws.

A Starter for Tomato Plants

One and a Half Tons of Tomatoes from Fertilizer Costing 48 Cents

Condensed from Farm Research

Charles B. Sayre
N. Y. Agri. Experiment Station, Geneva, N. Y.

IN a field experiment with cannery tomatoes made at Geneva in 1938 the application of some chemical fertilizers costing only forty-eight cents produced a gain of 1.44 tons of early tomatoes and increased the total yield 1.85 tons per acre over the checks. The chemicals were dissolved in water and applied at the time the plants were transplanted to the field. The results of this special treatment were so outstanding that the method is recommended to tomato growers.

For this experiment the plants were grown in accordance with the best commercial practices in growing plants for the cannery crop. Seed was sown April 1 and the seedlings pricked off into composted soil in 16- by 22-inch flats setting 108 seedlings per flat. They were moderately hardened in coldframes and were transplanted to the field on June 2.

Reprinted by permission from Farm Research, Geneva, N. Y., April, 1939

The soil was a well-drained Ontario loam which had been fertilized with a commercial brand of 4-16-4 fertilizer drilled broadcast at the rate of 800 pounds per acre two days before the tomatoes were transplanted to the field. The plants were spaced 3 feet apart in rows which were 5 feet apart. One pint of water was poured around the roots as each plant was transplanted to the field. The experiment consisted of a comparison of ten different treatments applied in this transplanting water. Four of these treatments proved of particular interest and form the basis of this discussion.

Table 1 shows the yields of marketable tomatoes from each treatment calculated on an acre basis. The yield records are divided into three increments, namely, early yields, that is the crop harvested to August 30; mid-season yields, from August 31 to Septetmber 9; and late yields, from September 10 until the last picking on September 26. The total yields are also given and with each yield increment is listed its difference (gain or loss) as compared with the check treatment (water only). By dividing the yield records into these three periods the effect of each treatment on earliness of maturity as well as on total yields is well illustrated.

From Table 1 it will be seen that treatment A which consisted of 20 ounces of Ammo-Phos 11-48 (11 per cent nitrogen and 48 per cent phosphoric acid) plus 10 ounces of nitrate of potash (13 per cent nitrogen and 44 per cent potash) per 50 gallons of water produced significantly higher early yields of tomatoes than any of the other treatments and that this increased early crop resulted in the largest total yield.

Treatment B, consisting of 10 ounces of Ammo-Phos 11-48 plus 10 ounces of Calnitro (20 per cent nitrogen) plus 10 ounces of nitrate of potash supplied the same amount of potash as treatment A and slightly more nitrogen, but only half as much phosphoric acid. Since treatment A produced significantly larger early and total yields than treatment B, it is clearly evident that the larger amount of available phosphoric acid as supplied by more Ammo-Phos 11-48 in treatment A was the principal factor stimulating earlier and greater yields of tomatoes.

It is a common practice of growers of cannery tomatoes to transplant the tomatoes with a transplanting machine which ejects from ½ to 1 pint of water around the roots as the plant is inserted in the soil. From 2 to 5 pounds of sulfate of ammonia or of nitrate of soda per 50 gallons of water is commonly used in the transplanter. Consequently, treat-

ment C, which consisted of 2 pounds of sulfate of ammonia (20.5 per cent nitrogen) per 50 gallons of water, should be of particular interest to growers who follow this practice. Altho this treatment contained nearly twice as much nitrogen as treatment A, it contained no phosphoric acid or potash. The significantly larger early and total yields from treatment A shows that a nitrogen fertilizer alone is not as effective as in a nutrient solution containing phosphorus and potash in addition to the nitrogen.

It has been repeatedly demonstrated by experiments here and at other stations on a great variety of soils that phosphorus fertilizers tend to stimulate root growth and promote earliness of maturity. Possibly this is one reason why a phosphorus fertilizer in the "starter" solution is particularly effective because quick rooting or a stimulation of root development is most needed at the time the tomatoes are transplanted. Consequently, a balanced nutrient solution high in phosphorus is recommended for the "starter" solution.

It seems surprising that such small quantities of nutrient materials used in a field already well fertilized would make such a striking increase in the yields of tomatoes. The most probable explanation is that this "starter" solution was applied in a particularly available form just at a critical time in the growth of the plants. At transplanting the plants are low in minerals and shorn of most of their root system. Consequently, the application of a correctly balanced, readily available nutrient solution revives and stimulates the plant, thus enabling it to withstand better the shock of transplanting and to become established quickly and grow vigorously from the time it is transplanted.

In this experiment the plants receiving treatment A were outstanding in size and vigor within two weeks after transplanting and within three weeks they were twice as large as the plants in the check treatment. No doubt the large increase in early and total yields resulted from this early stimulation of the plants.

One pint of solution per plant was used in this experiment, or 363 gallons per acre. This would require 9 pounds of Ammo-Phos 11-48 and 4½ pounds of nitrate of potash at a cost of only 48 cents for these materials per acre. One pint is more water than is commonly used in transplanting. Probably ½ pint per plant is more nearly the amount used by most growers; in fact, 150 gallons per acre is a common rate when using a transplanting machine. If ½ pint of "starter" solution is used per plant, the concen-

tration may be doubled so as to apply the same amount of nutrients per plant. Greenhouse tests showed that double the concentration, that is 2½ pounds of Ammo-Phos 11-48 plus 1¼ pounds of nitrate of potash per 50 gallons of water, could be used satisfactorily. In these tests there was no advantage in further increasing the concentration. It should be pointed out that it is safer to avoid greater concentrations because excessive quantities of soluble salts will injure or kill the plants. The concentrations employed in this test can be used safely.

A small amount of sediment or insoluble residue will settle out when these fertilizer materials are dissolved in water. To avoid getting this sediment in the tank on the transplanting machine and possibly clogging the tubes, the material should be dissolved in a separate tub or barrel and the solution strained when it is poured into the transplanting machine. Or a stock solution may be made up of 1 pound of the mixed fertilizer materials per gallon of water. This should be thoroughly stirred and allowed to settle. The supernatant liquid can then be dipped or poured out and added to the water in the transplanting machine to bring it to the desired dilution.

This spring one of the large fertilizer sales organizations will offer 10-pound bags of a mixture of 2 parts Ammo-Phos 11-48 and 1 part nitrate of potash, the proportions used in treatment A. These small packages will be very convenient for growers who wish to try this "starter" solution when transplanting tomatoes.

It should be emphasized that this nutrient "starter" solution is only a supplementary treatment to be used in transplanting tomatoes and is *not* recommended as the sole fertilizer application needed to produce a large crop of tomatoes. It should be regarded primarily as a "booster" or "quick starter" to be applied at a critical time in the life cycle of the tomato plant. To carry the vines thru the season to produce a heavy yield of tomatoes requires liberal application of fertilizer to the field.

The "starter" solution is likely to be most effective with cannery tomatoes. These plants are either local greenhouse and coldframe plants grown in rather crowded flats or southern field grown plants. In either case, the plants are likely to be somewhat starved or at least very low in minerals at the time they are transplanted to the field. The "starter" solution cannot be expected to give marked results with abundantly fertilized, more widely spaced plants such as are commonly grown by market gardeners, nor when the plants are transplanted

to field heavily manured and very liberally fertilized.

To obtain the largest yields of cannery tomatoes the "starter" solution should be supplemented with a "complete" fertilizer high in phosphorus. For silt or clay loam soils, the types on which most canning crop tomatoes are produced, 600 pounds per acre of a 5-20-5 or 750 pounds of a 4-16-4 fertilizer are recommended. On sandy soils 1,000 pounds of a 5-10-10 fertilizer is suggested. The method of applying the fertilizer is of great importance in obtaining the best results. Phosphorus fertilizers should be applied deeply. If the fertilizer is applied broadcast, it should be applied with the drill set about 4 inches deep and should be done after the discing and harrowing of the field are completed.

Less fertilizer is required if it is applied in correctly placed bands. This is done most conveniently with an attachment to the transplanting machine that applies the fertilizer in bands 3 to 4 inches below the surface and 2½ to 4 inches to the side of the plant. Three hundred to 500 pounds of fertilizer per acre are recommended when applied in bands.

Table 1

Increase in Early and Total Yields from Nutrients in Transplanting Water for Tomatoes, 1938

Nutrients Per 50 Gals. of Water, 1 Pint Applied Per Plant	Yield Period: To Aug. 30		Aug. 31–Sept. 9		Sept. 10–Sept. 26		Total Yields	
	Tons Per Acre	Gain over Check, Tons	Tons Per Acre	Gain over Check, Tons	Tons Per Acre	Gain over Check, Tons	Tons Per Acre	Gain over Check, Tons
A—20 oz. Ammo-Phos 11-48 + 10 oz. nitrate of potash	2.76	1.44	3.32	1.35	2.17	−0.94	8.25	1.85
B—10 oz. Ammo-Phos 11-48 + 10 oz. Calnitro + 10 oz. nitrate of potash	0.49	2.71	2.71	0.74	2.76	−0.35	7.28	0.88
C—2 lbs. sulfate of ammonia	1.46	0.14	2.38	0.41	3.37	0.26	7.21	0.81
D—Water only (check)	1.32	...	1.97	...	3.11	...	6.40	...
Difference required for significance	...	0.48	...	...	...	...	...	1.02

The Nittany Turkey

It's a New Breed of Turkeys Streamlined to Meet a Need for the Family-Size Bird

Condensed from Everybodys Poultry Magazine

Paul H. Margolf

Pennsylvania State College

EVER since the Nittany Turkey was exhibited for the first time at the last Neppco Exposition in New York City, we have answered inquiries from Maine to California concerning this new breed.

In 1929 we became interested at Penn State in the propagation of wild life, and this included the Pennsylvania wild turkey. It responded well to the confinement method of turkey production and each year the progeny became more domesticated in habits.

Then the special turkey report was released by the U. S. D. A. Bureau of Agricultural Economics showing from their survey that the small turkey was in demand by the greater number of buyers of turkeys for home use. Quoting this report: "Unless the demand changes, which appears unlikely, future breeding operations in turkey production should probably be in the direction of small turkeys."

In view of this survey we began our selection work with the Pennsylvania wild turkey and developed a small turkey for family use. As a result of management methods we may say that the temperament of the Nittany compared to the Bronze in the turkey realm, is as that of the Leghorn compared to the Plymouth Rock in the chicken world. Future work will be with larger numbers of this breed emphasizing selection for shorter shanks and less ranginess in appearance.

Other domesticated varieties of turkeys such as the White Holland or Bronze show a wide gap in hen and tom weight distribution. The hens of these varieties average to weigh 12 pounds and the toms 20 pounds at 28 weeks of age. The latter weight is too heavy for the average family.

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This is where the 14-pound Nittany tom fits into the picture. Nittanies, both hens and toms, will qualify as popular sizes for family use.

Many light-weight turkeys offered on the market have little meat to cover the frame work of the bird and, therefore, appear as inferior quality. Because of the well rounded, thick-meated breast, the Nittany hen, when dressed for market, presents an attractive appearance. This and more can be said of the Nittany toms. Small toms of the larger domesticated varieties, because of their slab-sided condition, do not have the consumer appeal. Nittany toms not only have the appearance of a compact well-meated carcass, but supply at the holidays the oft requested 11 to 12-pound dressed turkey.

Because of the increased consumption of turkeys in restaurant and hotel trade, the large tom has a special demand before and after the holidays. Bronze and Nittany turkeys have been compared at Penn State in weight (growth) response to the amount of feed intake. Naturally, the large tom of the Bronze variety will be the more efficient in feed cost per pound of weight produced. But sometimes these large toms are sold at a sacrifice by our local growers in order to discontinue the costly maintenance rations of so large a turkey. This is a disadvantage to the grower of large size turkeys.

In addition, the Nittany tom will mature for market in less time than it takes the Bronze tom. Perhaps we should call the Nittany a holiday turkey. Certainly the tom is of a popular size for this season of the year and in addition has a well meated breast, streamlined for consumer appeal.

Those familiar with the part of the Pennsylvania State College Farm assigned to the poultry department will recall the view one gets of Nittany Mountain and other mountain ranges so numerous in this part of the state. Since the original stock of this variety roamed this tree covered mountainous area of central Pennsylvania, what more fitting name could be given to them that that of the Nittany Turkey.

Sex-Predetermination Experiments

Gale Carr

Condensed from Jersey Bulletin

THE age old subject of sex-predetermination is just as gripping in interest at this late date as in ancient times.

The many theories and practices advocated down through the ages are being supplanted by theories and practices based on more scientific data, most recent of which is controlling the acid-alkaline condition of the vagina, apparently effective on certain species.

The Shelby County Penal Farm became interested in the subject after checking the reports of experiments on rats and rabbits, conducted by the Applied Research Laboratory of Dayton, New Jersey, under the direction and for the New York News, a publication whose editors and reporters had studied all available research work in this country and abroad, making a first attempt resulting in failure, followed by success to a remarkable degree on second attempt, as indicated by reports.

Impressed by the possibilities of the same degree of success with cattle, the suggestion was made that such an experiment be carried on in connection with artificial insemination in this herd, resulting in a visit by Mr. Carl Warren, Medical Editor of the News, completing arrangements after checking facilities, for the first authorized experiment on larger animals in America, following the successful Applied Research Laboratories findings.

After receiving instructions and suggestions from Mr. Thomas Durfee, of the Applied Research Laboratory, the first attempts on cows failed of conception, indicated by menstruation, but by modification of technique, conception is being secured and, unusual as it may seem, artificial insemination has produced a better percentage than natural service.

A group of twelve (12) virgin heifers was first selected for the experiment, but later a number of other cows have been added, and if conception is not interfered with, sufficient evidence will be available from the first year's work by which to form conclusions. Examination of the surface of the vagina and cervix shows no evil effects from either of the solutions used.

The theory on which this experiment on sex control is based is that by changing the chemical balance of the vagina by douch-

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ing with acid or alkaline solution, the spermatozoa is affected, reacting in the desired manner according to the agent used, the acid solution being conducive to female offspring and alkaline to male offspring. Whether the chemical action stimulates or devitalizes the X or Y chromosome, as the case may be, is not known, but according to one authority if a drop of each chemical is placed adjoining a drop of spermatozoa, part of the sperm will head toward one chemical and the remainder in the direction of the other.

The procedure here is to use 2 per cent bicarbonate of soda solution for alkaline and 1 per cent lactic acid for acid douche, each in distilled water, douching thoroughly two hours before breeding or inseminating. Variation as to time and strength of solutions is carefully recorded.

The complete system of records for the whole herd permits a check on the theory of alternating oestrus periods. The occurrence of menstruation on the fourth day after oestrus, designating failure of conception, suggests a milder solution or longer period between douching and inseminating. If mating early in oestrus is conducive to female offspring and late mating to male, the complete record will record it, and conclusive evidence will be available concerning differences in ages, checking the theory that old males sire a greater percentage of male offspring and younger, more virile males heifer offspring.

If, with artificial insemination the small amount of naturally alkaline seminal fluid used is not sufficient to counterbalance the naturally acid condition of the vagina the records may tell why a majority of bulls to date have been dropped in this herd by that method.

Laboratories Progress Report

Concerning the sex control experiments by the Applied Research Laboratories, commissioned by The News, as referred to above by Mr. Carr, a progress report under date of January 4, says:

A grand total of 32 litters of experimental animals—rats and rabbits—has been produced to date. The sex preponderance in every litter have been correctly predetermined. There have been no failures. Odds against such a series naturally are 4,807,031,295 to 1.

The Laboratories began, on March 24, 1938, a series of treatments aimed to influence sex through feeding. One group of female rats was placed on an acid diet and another group on an alkaline diet. Results were negative. Eleven litters were produced with no appreciable change in the accepted sex ratio. This experiment was terminated in June, 1938.

Meanwhile the laboratory scientists were convinced that it was the final acid-alkaline balance or pH of the vagina which had to be altered in order to predetermine sex. They recommended a new series of tests with the solutions to be introduced directly into the vagina just before mating.

Theory and Technique

It is an accepted fact that there are two types of male spermatozoa—one carrying X or male-begetting chromosomes and the other Y or female-begetting chromosomes. The type uniting with the asexual or neutral female ovum determines sex in mammals.

Theoretically acid retards or weakens the male-type sperm or stimulates the female-type sperm, thereby giving the latter an advantage in its race to the ovum, while alkaline has the opposite effect.

The method of sex predetermination adopted by the Applied Research Laboratories is described by Thomas Durfee, Director, as follows:

"The estrus cycle of each female is followed by daily examinations of vaginal smears. On the date at which estrus is at a peak, each female is selected for breeding purposes. At this time the rat is douched with the correct solution to produce a preponderance of the desired sex—alkaline for males, acid for females.

"The solutions used are either a 3 per cent or 2 per cent solution of sodium bicarbonate in distilled water and a 2 per cent or 1 per cent lactic acid solution in distilled water. These are prepared fresh each week.

"Douching is carried out by means of an ordinary medicine dropper. As much solution as possible is introduced into the vagina and aspirated in and out at least three times to obtain maximum influence of the douching treatment.

"Immediately after douching each female is placed with a male in a small breeding cage. These cages are placed in a quiet dark room. At the end of two hours each mating is examined for evidence of copulation as demonstrated by the presence of a vaginal plug. In the absence of such a plug, the douching process is repeated and the male and female are again placed together. This procedure is repeated throughout the day at intervals of two hours until a vaginal plug is found. If no mating has been indicated throughout the day, further attempts are postponed until the next peak of estrus."

Rat Experiment No. 1

Twenty female rats are being used in this experiment. Ten are to be douched with acid to produce one litter each and then with

an alkaline to produce another litter each. Ten are to be douched with alkaline and then with acid.

To date 23 litters have been obtained—all correct. In the acid group there are 11 litters with a total of 16 males and 63 females. In the alkaline group there were 12 litters with a total of 69 males and 19 females.

There were five "reversal" litters. One female douched with alkaline produced a majority of males; douched with acid she then produced a majority of females. Four females douched with acid produced a majority of females; douched with alkaline they then produced majorities of males.

After consultations with Secretary of Agriculture Henry A. Wallace and his assistants, The News, on November 21, 1938, authorized a wholly new and widened series of tests with rats and rabbits. These were aimed to verify the first successful results. The old as well as the new experiments are now in progress.

Rat Experiment No. 2

One hundred female rats are being used. Fifty are to be douched with acid and 50 with alkaline. To date 6 litters have been obtained. In the acid group there are 3 litters with a total of 4 males and 14 females. In the alkaline group there are 3 litters with a total of 17 males and 3 females.

Rabbit Experiment

Forty female rabbits are being used. Twenty are to be douched with acid and twenty with alkaline. To date 3 litters have been obtained. In the acid group there is 1 litter with 2 males and 6 females. In the alkaline group there are 2 litters with a total of 7 males and 0 females.

Chemistry Weeds the Oats

Condensed from Eastern States Cooperator

John B. Abbott

CONSIDERABLE progress has recently been made in practicable methods of controlling kale, mustard and charlock. Three methods of attack, used in conjunction, are helpful in a control program; namely, a period of clean cultivation before planting row crops, the practice of harvesting spring-sown small grains for hay or silage before the mustard makes viable seeds, and the use of herbicides to kill the young weeds in small grains without injury to the crop.

As an illustration of the first method, let me cite a personal experience with some land which was very heavily loaded with viable seeds. I plowed this land in the fall and harrowed it as early as practicable in the spring to warm it up and make conditions favorable for mustard seeds to germinate. As soon as I got a good germination—and by that I mean a mustard plant per square inch or something of that sort—I harrowed the ground again. As a result of keeping that practice up at intervals until time to plant potatoes, I grew a clean crop of potatoes without very much trouble with mustard.

The next year I grew potatoes again so as to give the mustard seed in the deeper layer of soil a chance to germinate and be destroyed.

I am quite aware of the general opinion that it is virtually impossible to clear the land of mustard seed because of the fact that mustard seed will live at least 50 years in the soil if not given a favorable chance to germinate in the meantime. I think the crux of the whole matter is giving the mustard seed a favorable chance to germinate. That involves at least two years of clean cultivated crops so as to "farm the land both sides up" as the saying is.

With regard to the second method of mustard control, little need be said other than to note that when oats are cut for hay or silage, it is entirely feasible to cut them before the mustard makes viable seeds. That presents an entirely different picture from that which prevailed in the days when it was customary to thresh oats for grain. Threshing oats usually involved reseeding the farm with mustard.

In this connection, let me digress again to recite an experience

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of my boyhood. One year we had a few acres of oats—I do not recall how large a patch—but I do recall that we saved from the grain separator seven flour barrels full of mustard seed. We may or may not have had a larger quantity of oats—I do not recall that detail.

The reason I remember about the mustrad seed is that we used it practically all winter long to warm the water in the watering tub in the barnyard so the cows would have warm drinking water rather than ice water. I remember that we used to take a small shovel of coals from the stove and put it in the tank heater, and then pour about three or four quarts of mustard seed down on the edge of the shovel full of coals. The mustard seed being extremely rich in oil, generated heat about as well, I believe, as modern fuel oil—and smelled to high heaven.

The third method of mustard control, the use of herbicides, is extremely valuable, not only because it prevents the formation of seed and helps clean the land up for future years, but also because it gives an immediate result and increases the yield of the current season's oats crop by reducing the competition of weeds.

Two general methods of using herbicides have been proposed and used to a considerable extent in one place or another. Both methods are based on the fact that the tender growing tip of the small-grain is protected within the sheath, so that even if the leaves are rather badly burned, the small-grain plant is not permanently injured and will grow out of it in a few days. The plants of the mustard family, on the other hand, not only have the tender growing tip exposed, but also have broad leaves which catch and hold much more of the herbicide than the erect grass-like leaves of the small-grains.

There are two methods of applying the herbicide, depending upon the herbicide used. One is to dissolve the herbicide in water and apply it with spraying equipment such as is used to spray potatoes. Herbicides which are successfully used in this manner are sulphuric acid, iron sulphate, and copper sulphate. All of these chemicals work rather well; but they have three disadvantages. One is that they require special equipment for application. Another handicap is the necessity of handling a good deal of water. And a third and serious disadcantage is that they are of no value except as herbicides.

The other method of applying herbicides is to apply them as dusts at a time when the weeds are wet with dew. Materials in this class which have been used with varying degrees of success are common salt, Kainit and pulverized cyanamid. The common

salt has no value except as an herbicide and is not too successful as an herbicide. The others have fertilizer value and choice as to which one to use depends to a considerable extent on which plant food is more likely to give a profitable response on the oats crop, the potash of Kainit or the nitrogen of cyanamid.

Another factor to be considered is the ability to secure the chemical in question in dust form. Kainit, so far as I know, is not generally available in dust form. Pulverized cyanamid is available wherever cyanamid is sold. During the current season a new form, with less than the usual amount of oil so that it will dust readily, is available and can be had by specifying that the dusting grade is desired.

Pulverized cyanamid, as a rule, gives a profitable fertilizer response on oats because oats normally respond to nitrogenous fertilization. Pulverized cyanamid contains 22 percent nitrogen.

The difficulty with all of these methods lies in the necessity for certain special equipment to apply the spray or dust. In potato growing areas, where potato spraying equipment is available, it might be expected that the liquid treatments would be preferred, yet Aroostook county, Maine, uses a great deal more pulverized cyanamid than of all of the liquid herbicides together.

Outside the potato growing areas where sprayers are not generally available, the dusting method has a distinct advantage, because nearly any good fertilizer broadcasting equipment can be modified to do a fairly good job of dusting.

The trick is to shut down the rate of feed of the fertilizer broadcaster to about 100 pounds of the dust per acre and then hang below the discharge openings a cylinder of several thicknesses of poultry wire for the dust to fall through so it will be broken up and make as even a pattern as possible.

I have found it helpful, in my own experience, to have a light pole running through a roll of poultry wire with the ends long enough so that they will be more or less continuously bumped and joggled by the spokes in the spreader wheels.

In the application of any herbicide, either spray or dust, it is important that the herbicide be applied while the mustard plants are relatively small, say with a total leaf-spread of less than three inches and with not more than four leaves. Mustard plants larger than that are hard to kill and results are far less satisfactory.

Liquid spray, of course, should be applied after the dew is off in the morning and when bright sunshine is in prospect, while

dusts must be applied before the dew is off in the morning and also when bright sunshine is in prospect.

It might be expected that spraying or dusting would wipe out the stand of clover as well as the stand of mustard, but my experience has been that it does not do so. Why this is so, I am not prepared to say, though I have a notion that perhaps a good many clover seeds germinate after the mustard is killed.

At any rate, my experience in dusting with pulverized cyanamid indicates that the stand of clover normally is not injured and that the yield of oats for either hay, silage, or grain normally is increased to a sufficient extent to show a satisfactory profit on the cost of the treatment entirely aside from the matter of weed control.

Why get up a blood pressure over controlling kale, mustard and charlock in oats? There is just one fundamental reason and that is that these weeds have their one best chance to reseed the farm in the oats crop. They do not bother in hay or pasture and can be controlled in cultivated crops; but if not controlled in oats, they reseed the farm and make fighting them a never-ending battle. Control them in spring-sown small-grains and in a few years you have a clean farm.

The Economics of Squab Production

Condensed from New Jersey Agriculture

C. S. Platt

Associate Poultry Husbandman

WITH the establishment of the New Jersey State Pigeon Breeding Test, at Millville, on October 1, 1931, an opportunity presented itself for the first time in the history of the poultry industry in New Jersey to gather some authentic figures on squab production. When the project was started the plan of operation followed was based almost entirely upon what had been done in connection with egg laying contests. Definite entries were obtained from pigeon breeders throughout New Jersey and other sections, each breeder to send five pairs of mated pigeons, with the objective in mind of finding out which pairs produced the greatest weight of squabs throughout the year.

The results of the first year showed a wide difference in the productive possibilities of pairs of pigeons, some producing only two or three squabs in a year with a total weight of approximately 50 ounces; whereas some produced from 18 to 20 squabs a year, with a total weight in excess of 300 ounces. The amount of variation in the ability of pigeons to produce a large number of marketable squabs was found to be almost as great as the variation of chickens to produce eggs. This information led to the development of a program whereby squabs were pedigreed from the best pairs, and these young squabs were then sold back to the original men who had entered the stock, or were sold by them to other pigeon men for breeding purposes.

In addition to a program of pedigreeing the squabs, there have also been established certain definite facts relative to the costs of squab production—at least the costs that are involved in the amount of feed used.

During the first five years of the operation of the Pigeon Breeding Test, a total of 721 pairs were kept for at least a period of one year. The average annual production of 721 pairs was 11.4 squabs that had a total live weight of 214.9 ounces. On the basis of 33.5 cents per pound (dressed), the average market price of squabs over the 5-year period, the annual gross return

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from a pair of breeders was $3.89. Some of the better pens throughout the 5-year period, however, produced squabs that had a market value in excess of $5.00 annually per pair of breeding pigeons.

The cost of feed in connection with the production of the market squabs was $2.43 annually for the the better stock in the leading 5-year period. On this basis the average income in excess of cost of feed was $1.46 per pair. With the better stock in the leading pens the income over cost of feed exceeded $3.00 per pair of pigeons.

The possibility of breeding up pigeons to a flock average that would be equal to that of the leading pens is a question that will need to remain open until several years of improvement work has been done. But in any event, the data collected have definitely pointed out the vast difference that does exist in the market value of the squabs produced by different productive types of pigeons.

On the basis of a $1.46 return annually per pair of pigeons over the cost of feed, which was secured at the test, the question arises as to how much additional cost might be involved in the production of market squabs. Actually, about 25% of the pairs entered each year proved definitely that they were not worthy of being kept over for future squab production. Under commercial conditions, therefore, such pairs would need to be disposed of at the end of each year and replaced by new stock.

The losses in breeding stock from other causes were negligible, as less than 3 per cent of the pairs were broken during any one year because of the loss of either one or both of the mates. This loss from mortality is extremely low, when compared with the losses in egg laying contests for chickens, where approximately 25 per cent of the producing units actually die during the year. In addition to this loss in fowls, there is also a loss of 20 per cent in cull and poor type birds that are not fit to be kept over for future production purposes.

Considering that in pigeons at least 75 per cent of the stock can be kept over a second year, whereas in chickens not over about 40 per cent of the stock is worthy of keeping for more than a 1-year period, it can readily be seen that the pigeons have a decided advantage in the matter of replacement costs. With only one-quarter of the stock to be renewed each year, it is possible to maintain a relatively high production in a well-managed pigeon loft. Pairs that have been kept over for more than one year have shown a decided tendency to maintain their same rate of

squab production for at least three years in some of the work that has been done along that line. Just how many years a pair of pigeons will produce at a satisfactory rate is still an open question, but at present there seems to be every indication that they have a tendency for longer useful life than is the case with chickens. In attempting to arrive at costs in addition to the actual feed required for squab production, this matter of replacement is of decided importance because the returns from the producing birds must cover the cost of the young stock that needs to be raised.

During the period of the test a few pens of "youngsters" were raised each year, and it was noted that it took about 25 pounds of feed to raise a pair of pigeons from the time of weaning from the adult stock until they were ready to be used for breeding purposes. Most of the young pairs were mated when about six months old, which is the approximate time required to raise a pullet to egg production.

The feed cost of maturing the young stock to six months, when divided over the cost of the mature stock that must carry the load, was found to be about $.20 per pair of actual working pairs of pigeons. When this is deducted from the original $1.46 which was realized over the cost of feed for the actual market squab production, a balance of $1.26 remains to cover costs of labor, litter, electricity, interest, taxes, and other miscellaneous items. These items, of course, vary with the individual farm and it would not be feasible to make any attempt to establish a standard. Considering, however, that those who keep poultry for market egg production, work on a margin that does not exceed $1.25 per bird for the charges indicated above, it would seem that the squab producer had just as much of an opportunity to make a satisfactory living as the average poultryman.

Although it is true that the figures collected would indicate that the possibilities of squab production are just about the same as those of commercial egg production, still the opportunities always will be restricted because squabs are a luxury product. This will of necessity always be true, as the records show definitely that the feed requirement to produce one squab is approximately the same as that to produce one dozen eggs. In nutritive value as a human food there is considerably more to be gained from the one dozen eggs than from the one squab. Because of this fact, which is something that probably never will be different, squab meat always will be more or less of a luxury. Over-production of squabs, therefore, is something

that can be of a very serious nature, and any expansion in the business of producing them should be done very carefully.

Finding a satisfactory market for squabs is one angle of the problem that should always be considered before a new plant is established.

The market angle of squab production is of more importance for the successful operation of a pigeon plant than would be the case in egg production, because the product is more perishable and it must be marketed at a very definite time. It would seem that the production should be restricted more or less to areas where a reputation has been established, or to certain very special locations where a nearby market can be assured.

Where to Put Fertilizer

Results of Minnesota Experiments

Condensed from The Farmer

JUST how much of an increase in yield of corn or of small grain may be expected as a result of applying commercial fertilizer on poor soil?

That and some other questions were in the minds of C. O. Rost and R. M. Pinckney, both of the division of soils, University of Minnesota, as they seeded 58 experimental plots last spring. When the growing season ended, and the crops were harvested they found that the fertilizer in some instances almost tripled the yield of both small grain and corn, and it hastened the maturity of corn. Even the most enthusiastic advocate of commercial fertilizer would hardly expect any such yield results, but these trials prove just what fertilizers do accomplish in extreme cases.

In addition to their wanting to know how much yields might be increased, Mr. Rost and Mr. Pinckney also wanted to answer these four questions:

1. How much fertilizer is needed for small grain and for corn?
2. What method of application gives best results?
3. Does commercial fertilizer so damage the seed that there is poor germination?
4. Does fertilizer hasten the maturity of corn?

In their experiments with corn the soils specialists used a 4-10-6 mixture (4 parts nitrogen, 10 parts phosphate, 6 parts potash) and applied it by two different methods in quantities of 125, 250, and 500 pounds per acre. On some plots the application was made with a fertilizer attachment on the planter, one which dropped the fertilizer in two bands, one

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on either side of each hill, and slightly above the seed. On other plots the application was broadcast, and then disked before planting.

In all plots the hill placement of the fertilizer, spread with the fertilizer attachment on the planter, gave much better results than the broadcast and disked-in method. Where the application was made broadcast 500 pounds of fertilizer was used per acre, and the yield was 41 bushels. Average yields on the plots where the fertilizer attachment was used, and where the application rates were 125, 250, and 500 pounds per acre, were 47 bushels, 43 bushels, and 52.6 bushels, respectively. Average yield of unfertilized plots was only 25.3 bushels. Of course, all plots were the same size, and all of them were alike except for the method of fertilizer application, and the various amounts of fertilizer used.

Considering the investment in fertilizer the plots which yielded the highest average returns were those in which the application was 125 pounds per acre. It is true that these plots did not yield as much corn as did those where the application rate was 500 pounds per acre and spread with an attachment, but the smaller investment in fertilizer more than made up for the difference in yield. Moreover, corn in the plots where the attachment was used and the spreading rate was 125 pounds per acre, matured more rapidly, as measured by moisture content, than did corn in the other plots. The corn in the latter plots contained 17 per cent less moisture than corn from untreated plots and from 1 per cent to 13 per cent less moisture than the corn from the other treated plots.

On their findings concerning the effects of fertilizer on the germination of corn, Mr. Rost and Mr. Pinckney reported: "With amounts ordinarily used in farm applications no damage to the stand was observed. When large amounts were used all materials reduced germination, although those carrying the larger amounts of nitrogen were most active in this respect."

In setting up their experiments on small grains, the two men fixed their attention on barley, seeding it on a silt loam soil known to be deficient in phosphate. As with corn they left several plots untreated, while on others they applied 45 per cent superphosphate at the rate of 100 pounds per acre by four different methods:

1. Broadcast before seeding and disked in.
2. Combination grain and fertilizer drill.
3. Fertilizer drill before seeding.
4. Broadcast on top of the ground after seeding.

"The largest increase," they reported, "was secured when the fertilizer was applied with a combination fertilizer-grain drill at the time of seeding." And what an increase that was! Whereas the barley on the untreated plots averaged only 8.8 bushels per acre, that on the plot where the combination grain and fertilizer drill was used yielded 24.7 bushels per acre. Least benefit was shown on the plots where the fertilizer was broadcast after seeding. Average of those plots was only 15.6 bushels per acre. Average of the plots where fertilizer was broadcast and disked in before seeding was 18.4 bushels per acre, and where the fertilizer was spread with a fertilizer drill before seeding, the yield was 22.4 bushels.

Not only did the fertilizer in the plots where the combination grain and fertilizer drill was used almost triple the yield of barley, but the two men reported no observation of the stand being damaged as a result of treatment.

Money from Farm Woodlots

Condensed from Michigan Farmer

Raymond W. Turner

THOSE farmers who overlook their farm woodlots as a source of revenue are missing a chance to earn extra money during the winter months. During that season when other work is not pressing, farmers can put in many profitable hours in their woodlands.

To find out just how much well managed farm woodlands do pay, one farmer whose efforts have been recorded in "A National Plan for American Forestry" kept records for a 13-year period and found that his hardwood forests brought him an average of $10 an acre each year, a figured which compared favorably with the $19 an acre which he realized annually from land planted to cereal crops.

The secret of financially successful farm woodlots is a system of management known to foresters as "sustained yield." Defined, this term means that a forest under sustained yield is cut regularly, but that no more wood is taken out at any one time than has grown since the last cutting. Thus forests on a sustained yield basis can go on producing wood for centuries.

Although the sustained yield process has been perfected only

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by years of research and experiment by trained foresters its fundamentals are fairly simple and can be readily understood by the average farmer. And the farmer who skillfully applies sustained yield principles to his woodlots will find that he can double or treble the rate at which they can produce wood and profits. The fact that the average Michigan farm woodlot today produces only 250 board feet per acre a year is doubtless one of the reasons why woodlot owners have not taken them more seriously. With the realization that production can be raised to 500 or in some cases 700 board feet per acre a year, it is likely that many farmers will put their forests under sustained yield management.

A sustained yield management plan for farm woodlots has three distinct parts each of which is vital to maintenance of a continuous inflow of revenue. The most important of sustained yield practices is to retain trees in the stand only while they are growing rapidly. When growth rate begins to slow down at larger sizes, they are cut. These trees are sold and bring good cash payments.

The second practice is to thin out the forest at regular intervals in order to give trees the space which they must have to grow rapidly.

The third, and most often overlooked essential, is to restrict or totally eliminate stock grazing within woodlots. Such restrictions are slightly inconvenient, but without them young trees are destroyed and sustained yield becomes an impossibility.

In practice the best way to insure sustained yield is to cut all trees when their rate of growth begins to slow down. A tree that is growing slowly is of course making money slowly, as the only way trees can become more valuable is to increase in size. When a tree has reduced its growth rate, it is only logical to remove it in order to leave space for neighboring trees which are growing rapidly.

It is not always easy to determine just when the growth of a tree begins to slow down. The surest method is to inspect stumps of recently felled trees in the same or adjoining woodlots. As is known to every schoolboy, each growth ring on the stump represents one year's growth. One has but to measure the diameter of the circles at the point where rings begin to crowd closer together. This process should be carried out with several samples of each kind of tree growth in the woodlot, a careful record of each measurement being kept.

From these records a table may be easily set up to show at what sizes different kinds of trees begin to slow down growing activities.

Then it can be made a standing rule not to cut for timber any log until it reaches the prescribed diameter limit (foresters measure tree diameters at "breast high" which is 4 feet and 6 inches from the ground). This practice in addition to producing greatest efficiency from tree growth will prevent the natural tendency of many loggers to cut smaller trees each year and so ruin sustained yield by cutting wood faster than it grows.

Cutting diameters for different kinds of trees will vary from 10 inches to 24 inches or even more depending upon the kind of tree and the qualities of soil and climate. It is important to set the cutting limit at a maximum because smaller trees yield much smaller volumes of timber and for that reason may not bring satisfactory profits.

Although high prices usually form the best indication of when to cut, cuttings for logs are usually made at five year intervals. However the farmer who owns a large woodlot of about 20 to 25 or more acres can easily divide it into five parts and cut on a simple rotation that will give him work and revenue for every winter.

Thinnings, the second phase of good woodlot management, may be made at the same time as logging operations. The primary objectives of thinnings are to open up the stand for more rapid growth and to improve the stand by removal of less valuable trees and crooked, diseased or dead trees that will never produce good sawlogs. It is hard to set definite rules stating which trees should be cut in a thinning operation because the problem is different for every acre of forest. Here the farmer must use his own judgment and free by thinning those trees which seem to be crowded. It must be remembered that crowded trees grow very slowly.

A fairly good rule of thumb to determine how close together trees should grow is this: for each inch in diameter of a certain tree, there should be 18 inches of distance from it to its nearest neighbor. This rule applies only to larger trees as there must be a quantity of saplings and seedlings in a well managed forest.

Oftentimes the problem of what trees to remove during a thinning is answered by removing crooked, diseased or otherwise inferior trees. In some stands the quantity of these makes ample space for the good trees to grow.Trees such as pin cherry and ironwood are usually thinned out as useless although care must be given to keep a good mixture of trees in the woodlot.

It is a common error to think of thinnings merely as expenses that must be met in managing a

forest. To the contrary, thinnings nearly always pay for themselves and sometimes show definite profits. The wood removed during thinnings may be too small for the sawmills, but it finds ready use as fuelwood, fence posts, or in some districts as pulpwood or for wood distillation. Certainly fence posts and fuelwood can be used at home even though there be no outside market for them. Fence posts of certain woods have been shown to endure nearly as long as steel ones, so keep the cost of fence repairs down as far as the most modern metal posts.

Keep Cows and Sheep Away

It is unfortunate that cows and sheep cannot be permitted to pasture in a well managed farm woodlot, yet their removal is essential where timber production is being emphasized. Stock animals are particularly devastating to hardwood forests which they destroy by chewing sprouts of young trees giving few a chance to grow. Stock also tramples forest litter and so tramps down the soil that new seedlings are unable to get started.

As a result of careful but inexpensive management, the farm woodlot will become an ideal environment for growing trees. If thinnings have been skillfully made, the stand will be made up of trees of all ages up to the cutting limits. Starting with the largest trees there will be only a few individuals on each acre. But smaller classes will have more members. This proportion is kept because a certain number of trees may be counted upon to die or be blown over before reaching maturity, the hazard being greater for smaller trees.

The mixture of age classes will include several species of which valuable timber trees will be in the majority. A further characteristic of an ideal, well managed woodlot will be a profusion of small seedlings on the forest floor; these the result of restricted grazing.

The farm owner has a choice of two methods of selling timber. The first is to sell standing timber and let the buyer remove the logs. The second choice is to log the timber himself, perhaps even carrying the logs to the nearest mill in his own truck. The advantages to the farmer who does his own logging lie in the marked differences between prices paid for standing timber and for sawlogs at the mill.

About twice as much is paid for logs as for standing timber. The farmer may regard this difference in price as payment for the work he does in logging his own forests. This extra money will be particularly interesting to men who seek profitable employment during the winter months.

Farm Records Show What Practices Pay

Condensed from Better Crops with Plant Food

J. A. Elliott

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THE man doing the job is still the best source of information on how it should be done. With this in mind, the University of Tennessee Agricultural Extension Services set out several years ago to discover the "hits and errors" in farming through a co-operative farm-account project. The farmers agreed to keep the records; the Service, through its Farm Management Department, agreed to make scientific and detailed studies in an attempt to determine what the ills of farming were and what paid best.

Now with more than 15,000 records of actual farm operation collected over a 12-year period, these Farm Management men are able to say with a good deal of justification what the agriculture of this section needs. And due to its diversity of climate, topography, and resultant types of farming, the variety of farming conditions found in Tennessee represents about everything found in the Southeast. A study of the records indicates that farmers generally need to:

(1) *Provide home-grown foods for the family.* The smaller the farm business, the more important the food production program becomes. Frequently on farms where subsistence is carefully planned, the value of food produced amounts to as much as the products sold. Farm and home records show that farm food products consumed in the home often amount to $400 or more in value each year. Where these items are overlooked it is necessary for the farm to produce 7 or 8 additional bales of cotton, 600-700 bushels of wheat, 1,500-2,000 pounds of Burley tobacco, or 20-25 top hogs to buy them.

(2) *Have three or more dependable sources of income.* Several sources of income encourage crop rotation for fertility maintenance and erosion control; spread the labor load; lessen the danger from crop failure or low prices; and keep ready cash coming in at different times during the year, thereby cutting down the need for credit, with the necessary interest payments, found on most one-crop farms.

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The main sources of income should be selected so as to yield the largest net income from all resources. They should not compete for land or labor but should supplement each other.

(3) *Increase crop yields.* Records clearly indicate that crop yields should be from 25 to 50 per cent higher than the present average for efficient production. Low crop yields are usually associated with high production costs. Data obtained during recent years show that it costs 69 cents per bushel to produce corn where yields are less than 20 bushels per acre, and only 32 cents where they are 40 bushels or more. Similar studies on cotton show a cost of 12 cents per pound where yields are less than 150 pounds lint per acre, contrasted with 6½ cents where they are 500 pounds or more. Burley tobacco was produced for 8½ cents per pound where yields were 1,250 pounds or more, but cost 12 cents where they were less than 750 pounds.

(4) *Increase livestock production per unit.* Farm flock cost records during the 5-year period 1930 to 1935 showed the income per hen above expenses to be $2.33 where production exceeded 200 eggs annually and only $1.05 for the group of hens producing less than this number. Tests by dairy herd improvement associations in Tennessee last year revealed that feed costs per 100 pounds of milk averaged $1.05 on 563 cows making over 5,500 pounds, but ran up to $1.54 on 651 cows making a yearly production of less than 4,000 pounds.

(5) *Balance crop and livestock production.* On most farms there are waste products from crop production that may well be fed to livestock. Likewise most farms have land that is best adapted to pasture under a soil conservation program. Adequate crop rotation almost always provides hay and pasture for livestock feed. Livestock, requiring most attention during the slack winter season when work with crops is not pressing, help to spread the labor load and keep farm hands profitably employed. Then, too, experiments show that grains and roughages may be marketed through livestock, and, with careful preservation of manures, from 60 to 80 per cent of the essential plant food elements returned to the soil. The most successful general farms almost always receive as much as 40 per cent of their income from animal sources.

(6) *Use more of the intensive enterprises, particularly on the smaller farms.* After all, farmers are selling three things: The use of land, labor, and capital. As farms become smaller with increasing rural population, there will be less land per family from which to sell products. It may be

difficult to increase the amount of available capital but oftentimes it's possible to intensify the farm business with no additional money or land. It would be difficult to make a decent living for a farm family on 75 acres with only wheat, beef cattle, and sheep, regardless of how efficiently these might be produced. These enterprises require relatively large amounts of land and would not keep the family employed at profitable labor. Invariably, the smaller farms making the best incomes combine some of the intensive enterprises such as tobacco, cotton, dairying, poultry, truck crops, or fruit with the more extensive beef cattle, sheep, small grain, and hay crops. Even with the intensive enterprises, farms are usually too small for efficient operation if they do not have as much as 30 acres of cropland. This, of course, is not true of farms with some specialty product.

(7) *Provide productive work for all available labor throughout the year.* Labor is usually the largest single item of expense on Southern farms, frequently amounting to 40 per cent or more of the total expenses. Thus it's good business to keep labor busy at productive work, especially hired labor. Productive work means producing something to sell or to feed to livestock to be sold. The same principle holds true for workstock as well as men. It costs between $50 and $75 to properly keep a work animal for a year, and unless you get around 150 days work out of it you pay rather dear wages.

(8) *Use adequate crop rotation for fertility maintenance and erosion control.* Experiments show that where corn followed corn with no cover crop, an average of 48.6 tons of soil was lost per acre through erosion, while on similar soil under a 3-year rotation of corn followed by wheat and clover and timothy for 2 years, only 3.74 tons were lost. Winter-cover crops on row-crop land are particularly important in soil protection and fertility maintenance. At the Tennessee Station, corn after corn yielded 30.8 bushels per acre. On similar soil where crimson clover was planted after the corn in the fall and turned under for the crop next spring, the yield was 43.4 bushels. Cotton following land in winter fallow made 416 pounds of lint, but where crimson clover was turned under made 530 pounds lint.

(9) *Improve carrying capacity of pastures.* Pastures are our cheapest livestock feed. Adequate fertilization and judicious grazing have the most pronounced effect on thickening pasture sods. Many pastures are grazed too closely and erosion and stunted herbage result.

Marketing and Hog Cycles

Condensed from Hog Breeder

Col. Edward N. Wentworth

Director Armour's Livestock Bureau

MARKETING, in general, involves all of those services required in the selling of a commodity; namely, the transporting to point of sale, the preparation of the commodity in salable units, and the actual selling transaction. In most instances marketing covers both the raw materials and the finished products of a given industry. Frequently it is difficult to determine whether some of the services performed are marketing or processing services, so closely have both types of service become interwoven.

Marketing is as essential as production and is, in fact, part of production, for sales value is added to the product through processing or through transporting it from areas of surplus production to areas where consumption exceeds production.

The housewife in Philadelphia has no use for a hog in Omaha, but she will buy pork chops, ham or bacon in Philadelphia at her neighborhood retailer's shop.

In general, the production of livestock and chops is in such limited volume on each farm that the selling and processing of these products cannot be performed economically at the place where they are raised. A slaughter house, flour mill, or creamery, requires the production from a large number of farms in order to have sufficient volume to operate efficiently, therefore, agricultural products must be assembled at convenient points (such as public or local markets) so that processors and distributors can select desired grades in sufficient volume to operate economically.

In the case of hogs and other livestock the relation of local production to local consumption may be measured by the number of animals per 100 persons in a given area. For example, Iowa normally has nearly 500 hogs per 100 persons, while New York had correspondingly only 15 hogs per hundred population and Pennsylvania only 57 in 1935. Deficient or surplus production is not always directly related to the ratio between people and hogs, due to local variations in pork consumption and to the average rate of

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livestock finishing in certain areas. Yet in a general way, the areas of surplus production furnished pork for the people living in areas where hog production per 100 population is low, but such pork necessarily must be transported either alive, as carcasses or parts of carcasses, or as finished food products.

The almost constant changes in the supply of hogs from month to month and from year to year are known to influence hog prices. The total production of hogs, however, is much more extreme in its fluctuations than are the other livestock products. The principal reason, of course, is the short length of time required to produce a market hog. Ten months from the time a sow is bred, her litter can be ready for slaughter and the sow may have a second litter already farrowed. The number of sows bred, the number of pigs born, and the number of hogs fattened can be increased or decreased in response to the prospect for profit from the pork producing enterprise in much less time than it takes to get a return from the increase of dairy cows or beef cattle. Farmers apparently are influenced in their breeding operations more by the relation between corn and hog prices at breeding time, or just preceding the breeding season, than by any of the other factors, and the corn-hog ratio is said to be responsible for about 70 per cent of the variations in hog receipts. The total pork production is also influenced as hogs are finished to heavier weights when the corn-hog ratio is favorable.

Climatic conditions at farrowing time are considered the next most important factor influencing receipts; one authority considers this factor responsible for about 18 per cent of the variations in the number of hogs marketed. Other less important factors are the size and quality of the corn crop, availability of breeding animals, prevalence of disease, and the ratio between hog prices and steer prices.

Hogs are more dependent on a single feed crop than any other class of animals. While some other feeds are fed to hogs in great quantity, the price of corn is the measuring stick by which the cost of producing pork is figured. Over a long period of time it has been found that 100 pounds of heavy hogs are equal in value to 11.4 bushels of corn (both values are based on Chicago prices). Therefore the difference between the value of 100 pounds of hogs and 11.4 bushels of corn probably measures whether or not production of pork is favorable or unfavorable. The response to the corn-hog price ratio, however, cannot be felt until approximately a year

later when the result of the stimulation or depression becomes apparent through a change in the supply of slaughter hogs.

Unfortunately this tendency of farmers to respond in apparent unison always seems to carry them too far in the opposite direction. The result is the more or less regular cycles which characterize hog price trends. In a period when the corn-hog ratio is favorable, farmers increase their breeding stock as long as the price relation is favorable, ignoring the fact that the price relation may have changed by the time the pigs are ready for market. When the accumulated increase does appear, the price relation becomes unfavorable and breeding operations are contracted, but the previously planned hog production continues for a year or more and prices are held low. Farmers continue to reduce production and the shortage resulting again brings a favorable price relation and the cycle perpetuates itself. The hog price cycle is due to the tendency of hog producers to over-shoot the mark in increasing and decreasing production in response to the corn-hog ratio.

The existence of recurrent cycles in the hog industry is indicated quite clearly by the estimated swine population which showed a slow, upward trend from the year 1900 to 1924 with fairly regularly recurring deviations above and below the general trend in hog numbers. These swings indicate the hog cycle, usually each cycle requiring from three to five years to travel from peak to peak or from trough to trough. The upward trend in hog population has apparently disappeared since 1924, but this has been in part due to the fact that since 1920 pork production increased more rapidly than hog population due to marketing a greater number of pigs per litter and a greater efficiency in pork production in recent years.

In 1928 the peak of a new cycle was reached. From the 1928 peak in hog numbers and an unfavorable corn-hog ratio, the swine raisers again reduced hog population to the trough of a new cycle in 1931. Although hog numbers had declined in this period, low prices prevailed due to the general business depression. Hog prices were low, and corn prices were down, so that the relative prices of corn and hogs were favorable to swine production in 1931 and 1932. Since the corn-hog ratio was favorable, even though hog prices were low, farmers attempted to increase their farm income through increased hog production. Hence a new population peak was reached in 1933.

Swine growers need to employ better mass judgment and adopt more stable practices.

Improving Milk Color

Condensed from Guernsey Breeders' Journal

H. H. Tucker

New Jersey Experiment Station

CARROTS have long been used as a feed for dairy cattle. This feed was common before there was any knowledge of the particular compound carotin, found in carrots and green grass, which is responsible for the improved yellow color of milk and for other beneficial properties.

With the advent of modern methods of merchandizing fluid milk, and delivery of fresh milk, there was a demand by the consumer for milk of higher yellow color. The Guernsey breed, of course, supplied milk of higher color than any other breed. However, her milk was not as high in color in winter as when she was pastured on grass in summer. Garden varieties of carrots have been shown to contain over ten times as much carotin as fresh green alfalfa when considered on dry matter basis. It was found that carrots could be stored and fed during winter to delay the undesirable drop in color in winter milk.

The cost of growing root crops, because of hand labor required, was found to be higher than that of growing corn. Results reported in West Virginia Bulletin Number 256 show an average producton of 10.9 tons of carrot roots per acre as compared with 10.3 tons of corn silage. They further show that the dry matter furnished by the corn plant cost only fifty-seven per cent as much as did the dry matter of root crops.

The cost of growing carrots, however, does not limit their use as much as does the cost of storage in cellars, loss in harvesting and storage, and the fact that they cannot be kept satisfactorily in this manner until the later part of the winter feeding period at which time they are most needed. In an effort to develop a better method of storage, it was decided to make silage from carrots. It was thought advisable to ensile the carrots and tops with green corn, since both would normally be ready to harvest at the same time. In this way, it was possible to store both feeds in one silo and to spread the carrot-feeding season out more than would have been possible had carrots been

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ensiled separately. Earlier feeding work showed that ten pounds of carrots per day definitely improved the color of milk. Since cows often consume forty pounds or more of silage per day, it was decided to ensile carrots with green corn at the rate of one part carrots and tops to three parts of green corn. The carrots and green corn supplied sufficient sugars for fermentation, thus making it unnecessary to add molasses or other preservatives.

Two-thirds of an acre of garden carrots were grown in the summer of 1937, and ensiled in September of that year. This area yielded at the rate of nineteen tons of carrots and tops per acre, of which seventy per cent were carrots and thirty per cent were tops. With this method, it was possible to save all small and broken carrots and tops which could not be saved otherwise. Less labor was needed to ensile carrots than to store in root cellars since carrots do not need to be topped or handled so carefully for silage. The carrots were hauled to the cutter, and fed into the cutter with the corn. These were weighed so as to get the desired proportion of carrots and green corn, as previously decided. This weighing would not be necessary under ordinary conditions. The carrots and tops may be chopped with any ensilage cutter which will handle corn. They were found to chop easier than corn and to mix satisfactorily with the corn in going through the cutter.

The silage was stored over winter, and fed out in March, 1938. It was found that the pieces of carrots retained their shape and color, and were of firm texture when removed. The flavor of the carrots was distributed through the corn and gave a silage which was relished by the cows, and was consumed slightly more readily than was corn silage.

Feeding trials were run during March and April to determine the value of this feed in maintaining or increasing milk color and production.

Cows used in this feeding trial had previously been used in a reversal feeding trial extending from October 12, 1937, to February 28, 1938, in which trials grass silage and hay, and corn silage and hay, had been compared with beet pulp and hay.

Four Guernseys and two Holstein cows were used in each of the two groups in this experiment. These groups of cows were balanced as to breed, age, milk production, stage of lactation, stage of pregnancy, and previous records of milk color.

In the final feeding period of the previous feeding trial, all cows had received beet pulp and hay as a color-depleting feed. It was, therefore, possible to com-

pare this depleting period with the carrot-corn silage feeding period. The carrot-corn silage feeding period was of three-weeks' duration after a one-week transition period.

Silage was fed ad libitum, and hay was fed at the rate of one pound for each 100 pounds of body weight. Grain was fed at the rate of one pound to four pounds of milk production for Guernseys, and one pound of grain to each five pounds of milk production for Holsteins. Silage and hay weights were checked once each week.

Samples of both morning and night milk were collected on two days each week, and tested for butter fat and color. Milk production was recorded at each milking.

Color values reported here are for the last week of each feeding period. These values were taken since there was a gradual change during each feeding period, and the effect of each feeding period was shown in the early part of the following period. Greater difference in color would no doubt have been shown had the feeding periods been of longer duration.

This carrot-corn silage, when fed with poor quality field cured hay, increased milk color from a beet-pulp value of 4.95 to 5.23, or 5.65 per cent increase at the end of three weeks. All cows showed a gain in milk color, with greatest gains made by cows producing milk with lowest color.

Ten of these cows, eight Guernseys and two Holsteins, were continued on a further study to compare the effect of continued carrot-corn silage and hay feeding with a ration of beet-pulp and hay. These animals were regrouped into groups A and B. Groups A and B were balanced as uniformly as possible as in the start of the experiment. They were also divided as to their previous feeding history.

Both groups had received beet pulp and hay in their first feeding period, and carrot-corn silage and hay in their second feeding period. In the third feeding period, group A was continued on carrot-corn silage and hay, while group B was fed beet-pulp and hay. Production values for these feeds are shown in Table I.

From this data it can be concluded that maximum color of milk cannot be obtained in a three-week feeding period. Carrot-corn silage increased color of milk to a greater degree from low-color cows than from high-color cows. Carrot-corn silage is at least equal to beet pulp in quantity of milk produced, and much superior in the color of the milk produced.

Other work has shown that increased yellow color of milk has been associated with improved flavor. It is possible, with this

cheaper method of handling and more efficient method of storing carrots, that carrots may come into more common use with milk producers who wish to maintain milk color throughout the winter.

Production Values of Carrot-Corn Silage Rations as compared to Beet Pulp Rations

GROUP A

	Beet Pulp and Hay Feb. 9-Mar. 1	Carrot-Corn Silage and Hay Mar. 9-29	Carrot-Corn Silage and Hay Apr. 6-26
Ave. Daily Prod. (Lbs. Milk)	22.77	23.14	22.42
Ave. Fat Per Cent	5.036	5.163	5.209
Ave. Color Reading	5.309	5.608	5.753
Prod. 4 Per Cent Fat Corrected Milk	26.31	27.18	26.49

GROUP B

	Beet Pulp and Hay	Carrot-Corn Silage and Hay	Beet-Pulp and Hay
Ave. Daily Prod. (Lbs. Milk)	25.24	24.46	24.00
Ave. Fat Per Cent	4.477	4.740	4.583
Ave. Color Reading	5.046	5.245	4.951
Prod. 4 Per Cent Fat Corrected Milk	27.05	27.18	26.10

A Test for Sows

Condensed from Capper's Farmer

M. N. Beeler

A Chester White sow yielded to the inevitable one morning in June. Had the event taken place at the customary season for farrowing on his farm in Scott county, Minnesota, Herbert C. Bohnsack would have called it blessed, because there were 10 big husky pigs. But he was preparing to build a barn, which made the litter inopportune.

Those little pigs grew up with that barn and, having no particular place to call home, became quite chummy with the workmen, as their kind is wont to do when subjected to constant human presence. Eventually their thrift and progress impressed Mr. Bohnsack and he took a few minutes off to look up the farrowing record. They were, he discovered, 60 days old and it was weaning time. Because they appeared so big for that age he caught and weighed a few just to settle an argument among the builders. The lightest was 57 and the heaviest 63 pounds. Perhaps he knew then but didn't take time to remember that the weanling is father to the hog—that progress to 8 weeks old is indicative of the market date and weight. So the portent of those pig weights passed unnoticed.

The sow farrowed again in 1936, but no special note was taken of the litter. He did do a little weeding of the herd that year, as an experienced husbandman will, by selecting those gilts for breeding which "looked right." By next season he had become interested in the Minnesota College of Agriculture plan for testing sows. Records were kept on 7 litters. The old Chester White came right back with confirmation of the intimation she had dropped two years before.

This time she had 12 pigs. At 60 days old they weighed 57 pounds apiece. He hadn't kept any of her first litter so that the other six sows were of unrelated breeding. Their litters averaged 40 pounds at 60 days old, a 17 pound difference. At 180 days old the Chester White's dozen pigs recorded an even bigger advantage, 50 pounds, over the others. Her barrows went to market at 250 pounds. All had had the same feed, the same care since birth and all were developed in the same lot.

"The difference was in the

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sow," said Mr. Bohnsack. "She had in her what it takes to make thrifty, fast growing pigs. Some of that was visible to the eye—good udder, roominess, good back, type all over, manageable disposition. But as far as it is possible to make such selection, the other sows had as much. She had more; what it takes scales and records to bring out.

"You see this testing plan gives us positive control of the last of three big factors in profitable pork production. The other two, right feeding and sanitation, have been in common practice a long time. Until now we have been in the dark on breeding. We've selected, yes, but we've made errors because it was necessary to guess. The plan gives us the same advantage that is available to the dairyman who tests his cows."

Sow testing is no fool-proof plan. It won't take the place of feed, nor simple precautions against diseases and pests. It is a complement to balanced rations and sanitation. Farmers who stepped up market maturity by adding protein supplements, eventually got into trouble from worms and filth-borne diseases. And the McLean county system of swine sanitation came into being. Those who adopted that as the cure of all troubles and neglected right feeding, got into more trouble. In Illinois, where the McLean county system was first demonstrated, it became necessary after a while to put on a campaign called "balancing corn for hogs," to make the sanitation program effective.

That left only one other important factor, power to produce, beyond control. Farmers who were uncanny judges of exterior indications of that hidden power got along. Those who just thought they could "pick 'em" didn't do so well. Others remembered the speckled pigs of boyhood and resorted to cross breeding. The mixture of blood added some of the required vigor. Then Minnesota animal husbandmen sought to guarantee even greater vigor by developing the crisscross system. That works but is subject to considerable opposition by breeders and folks who have learned their purebred lesson well.

Now comes the sow testing plan which reveals that hidden and highly desirable quality whether the sow be purebred, grade, crossbred, crisscrossbred, of this or that breed or combination of two or more breeds. It can be applied by any farmer who is inclined to take the necessary trouble of marking, weighing, recording and using the information which his own herd will supply, thanks to the practical minds who developed it.

Directions supplied by H. G. Zavoral, extension animal hus-

bandman, University Farm, St. Paul, Minnesota, who supervises the work in that state, are simple.

First—Each litter of pigs must be ear notched within seven days of farrowing. Special cards are provided for recording the markings, date of farrow, sire and dam and number of live pigs of each sex.

Second—Each litter should be weighed separately when 50 to 62 days old, or preferably at 60 days or weaning time. Should the farmer desire assistance in weighing or calculating the weights to 60 day basis, it is suggested he call on the county agent. To make an adjustment, when weighing does not take place on the exact date, multiply the actual weight of the litter by the fixed number of days (56 for 8 weeks or 60 because that is easy to remember) and divide by the actual days. Suppose for instance that a litter weighs 550 pounds when it is 62 days old. The 56 day weight is desired. Multiply 550 by 56 and divide by 62. That gives 496 pounds. If there are 10 pigs in the litter, the average weight is 49.6 pounds. If 60 days is to be the basis then the original multiplication should be by that figure.

Third—Where possible litter weights should be taken at 180 days. But weights taken anywhere between 170 to 190 days will be admissible and may be prorated. Adjustments can be made on the basis of 1¾ pounds a pig a day. Give that much for pigs under and subtract that much from pigs over 180 days.

Fourth—The results will show a difference in the litters at both weighings and in general those pigs which weigh most at 56 or 60 days will weigh most at 180 days. In fact some farmers who have been following the work during the three years since it was inaugurated believe the 60 day weight is most important and will supply all the information necessary. However that is merely an impression and until it is proved it will be best to follow directions.

In practical application the farmer uses this information to cull out sows which produce small or light litters. For replacements he selects gilts from the litters which make the best record, just as Mr. Bohnsack did. Obviously there was no question of choice between a 57 pound average for the Chester White litter and a 40 pound average for the others.

O. M. Sletta, Watonwan county, is using the sow testing plan in connection with a crisscross breeding system which has been under way 4 years and a sanitation program which he has maintained 6 years. His heaviest litter among 9 averaged 45 pounds a pig at 60 days. Others ranged down to 35.

"If I need any gilts for replace-

ments next time, they will be reserved from that best litter," he explained. "But I'm testing the same sows in their fall litters. If the same sow shows up again with the best weight per pig, then I can be doubly sure that gilts from her will possess rapid gaining prepotency.

"To avoid counteracting the sow selection, with a boar of low productive ability, I plan to get a sire from some fellow who is testing purebreds. It will need to be of the breed which is next in rotation for my crisscross system. In other words I'm doing with hogs just what I am doing in building up production in the dairy herd—using the test to determine the best female producers and as a guide in selecting a high production transmitting sire."

As a means of determining the best way of establishing the program, a complete livestock testing service has been established under University Farm supervision in Southeastern Minnesota. Duane Long was employed as tester with headquarters in Fillmore county. The Livestock Records Association presumes to keep account of swine, beef cattle, dairy cattle, sheep and poultry performance. In addition certain farm management studies are being made. Forty-five members, thirty-two in Fillmore county, ten in Houston and three in Mower, completed records the first year. Twenty of them tested sows.

One co-operator reported a 210 pound average in 5 months. Another sold his at 200 pounds when they were 5 days short of 5 months. Such quick pork making is possible only when the three factors, right breeding, right feed- and sanitation are satisfied.

You Can Check Blue Mold

Condensed from Southern Agriculturist

E. E. Clayton

Bureau of Plant Industry, U. S. Dept. of Agriculture

FOR the past eight years tobacco farmers in the flue cured, dark and burley belts, have been wanting a sure cure for blue mold—a fungous disease that wipes out young plants in the seedbed and costs Southern farmers at least $5,000,000 a year in the form of doubled seedbed area, aside from delayed plantings and failure to obtain sufficient quantities of healthy plants to set the acreage planned. This year, for the first time, the tobacco farmer is fortunate in having several control measures from which he may choose. These measures have been developed in this country by scientists of the U. S. Department of Agriculture, the state experiment stations and privately endowed research agencies, as well as by workers in Australia, where blue mold has been a serious problem.

The Australians introduced the idea of gassing the seedbeds for blue mold control, using benzol. The treatment was effective but cumbersome. A new and simpler gas treatment, using paradichlorobenzene crystals instead of benzol, has been worked out in this country in co-operative tests conducted last year by the Bureau of Plant Industry and the states of Georgia, South Carolina, North Carolina and Maryland. The discovery has been confirmed by other workers and at present gas treatment is the object of extensive research by many agencies. Under proper conditions, the gas treatment gives 100 per cent blue mold control, and has the further advantage over a spray treatment in that the gassing may be started after blue mold appears. The vapors not only prevent further development of the disease, but actually check and finally destroy infection already present in the plants.

This however, should not lead the grower to believe that gas treatment, to be effective, need not be carried out with the utmost care. Furthermore, damage caused before the treatment is started cannot be fully repaired. It is necessary, therefore, to begin a gas treatment before the plants are seriously affected. Last year some growers scattered paradichlorobenzene crystals in open beds. Such a method not only is ineffective, but may injure the plants. The best way to use the

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crystals is to scatter them on shelves nailed to the sides of the beds, or on a shelf built down the center of the bed.

The sidewalls of the beds must be tightly constructed so that little gas will escape when the beds are covered at night. With respect to covers, while much experimental work is in progress with ordinary tobacco cotton, the only consistently good control has been obtained with relatively tight covers, or a good grade of unbleached muslin with a thread count of about 60 per inch. Narrow beds, about six feet wide, are more easily covered than wider beds.

The "PDB" crystals are available at most drug stores. One ounce of PDB is enough to treat four to five square yards of bed for one night. The treatment should begin as soon as blue mold appears in the community and continue nightly as long as danger of the disease exists—ordinarily from three to four weeks. In experiments, diseased beds treated with PDB began to show distinct evidence of recovery after the third night.

On the other hand, the spray treatment using cottonseed oil and cuprous oxide has been tried on large-scale experimental tests for several years, and has been widely used by growers for one year. Consequently, its advantages and disadvantages are reasonably well established. The object of the spray treatment is not to eliminate blue mold infection, but the appearance of the disease in sprayed beds usually disturbs the person using the method for the first time. The spray treatment merely minimizes the blue mold attack to such a degree that little or no damage is caused. An advantage of spraying is that once the rather simple equipment is provided, a person can spray 50 to 500 square yards of bed with only a slight increase in labor or material cost. The complete cost is usually $3.00 per 100 square yards of bed, which is very much less than the cost of the gas treatments. Furthermore, spraying for blue mold can be readily combined with spraying for wildfire in areas where both diseases are present.

No treatment, of course, will give satisfactory control of blue mold unless it is properly carried out. The attention of growers is called to the revised edition of U. S. Department of Agriculture Farmers' Bulletin 1799 which has just been published, and which gives in detail the methods that have been found most effective in blue mold control. Finally, growers who plan to use one or another of these control measures, and have had no prior experience, should certainly obtain first-hand aid through local agricultural advisors.

Prussic Acid Danger Lurks in Sorghum Fields

Condensed from The Dakota Farmer

C. J. Franzke

Crops Specialist, South Dakota State College

IN 1930 the agronomy department of South Dakota State College became concerned over the losses in livestock because of prussic acid in sorghums. It was known that under certain conditions of growth the accumulation of the poison in sorghum plants reached such proportions as to produce death to livestock eating cured forage or pasturing on it. Most farmers believed that when sorghums were cut and cured for forage, they became no longer poisonous when fed to livestock. Many farmers feeding cured sorghum forage produced in 1934—a severe drouth year in the greater part of the United States—lost considerable numbers of livestock.

Our agronomy department in 1932 began an extensive study of prussic acid in sorghum to determine if it were possible to eliminate this forage poison. The work was soon under way, gathering materials and perfecting a speedy method for determining the prussic acid content. During the past seven years, several thousand individual plants have been studied for their prussic acid content.

The location of prussic acid in the sorghum plant is very important. Livestock, when pasturing or when fed cured sorghum forage, eat the leaves more readily than the stems. Several lines of Dakota Amber were utilized for this particular test. The average results reveal stems had .064% prussic acid and the leaves had .341%. It was found that the leaves carry the bulk of the deadly poison. It was further discovered that those plants which had a very high percent of prussic acid in their leaves did not necessarily have a high percent in their stems. In many cases the reverse was found, but in all cases the leaves carried practically the entire prussic acid content.

It is thought that climatic conditions influence prussic acid content in sorghums. In 1936, it was very dry during July and the first half of August. On August 13th, we had a little more than one inch of moisture. August 12th—one day before the rain—the prussic acid content in a high acid strain was .263%; the day it rained .230%; one day after it rained .213%, and six days after

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the rain .171%. There was a gradual decrease in the prussic acid content regardless of weather conditions. The prussic acid content in a given strain or line of sorghum is also closely related to growth stage. The sorghum plants had reached their high acid production as the seed was in the milk stage. As the sorghum plants mature, acid becomes less.

Environmental conditions play a paramount part in the prussic acid content in sorghum strains. In 1934, there were 12 known pure lines of Dakota Amber grown at the Cottonwood experimental farm and at the Brookings station. The strains having the highest prussic acid content at the Brookings station were not the highest at the Cottonwood station. They apparenty did not maintain any correlation in this respect excepting the low prussic acid Amber Number 39-30-S, which ranked 12th at both stations. The 12 lines of Dakota Amber averaged .128% prussic acid at Brookings, and at the Cottonwood station they averaged .415% prussic acid. The average prussic acid content in the 12 lines of Dakota Amber at the Cottonwood station was approximately 3¼ times higher than at the Brookings station.

Many farmers are under the impression that some sorghums—especially grain sorghums—do not contain prussic acid. This is not true. All members of the sorghum family contain this deadly poison. Types of sorghum vary in acid content. There may be high acid plants and low acid plants in any given variety or strain. Because of this, it is difficult to make any iron clad recommendation regarding safe utilization of mixed sorghums, varieties or strains.

It is a common belief that the second growth of sorghums is more dangerous to animals than first vegetative growth. A three-year average—1933, 1935 and 1936—showed the prussic acid content for several varieties of sorghum; first growth at a given stage had .192% prussic acid and the second growth at a like stage had .168% prussic acid. Second growth at a given stage may be no higher in its prussic acid content than first growth at that respective stage. Possibly the reason why second growth may cause higher livestock losses is because most secondary growth comes on when other feeds are matured or dried up and pasturage becomes short. Livestock, when turned out on second growth, eat it more eagerly than they would otherwise if other ample green feeds were accessible. They secure the fatal dose in a short time. If other green feeds were available, they would eat more slowly as well as make selection of plants grazed. This

would help eliminate some of the great danger but it is not a safe recommendation to advise farmers to graze second growth even though there may be other suitable feeds. There are many other factors to be considered over which the farmer has no control.

Many believe that freezing increases the prussic acid content in sorghums. On September 15, 1937, weather conditions indicated there would be a frost. The morning of September 16th, there was a heavy white frost. The minimum temperature was 30° F. The evening of September 15th, at 5.00 o'clock, a sample of green forage from a high acid strain was taken. It contained .455% prussic acid. The next morning at 4 o'clock, when the frost was falling, it had .397% hydrocyanic acid. At 8 o'clock A.M., after the frosted sorghum had thawed, it contained .196% prussic acid. After 10 o'clock, when the sorghum plants became dried, the prussic acid content was more or less uniform for the remainder of the samples taken throughout that day. Some of this frosted material showed further losses in its prussic acid content.

The frosted sorghum lost 69.2% of its prussic acid. Allowing the frosted sorghum to cure 48 days, it lost 83.3% of its prussic acid. Harvested and cured frozen sorghum can be utilized for livestock feed. It may be possible that immatured sorghum, high in prussic acid, harvested before frost, shocked, frozen and never thawed, may not lose its prussic acid. When this uncured frozen forage is eaten by livestock, it thaws out in the animal's digestive tract, liberating its prussic acid content more rapidly than the dried, well-cured sorghum forage. Most cases of forage poisoning reported are from feeding immature, poorly cured sorghum forage.

The harvesting and curing of sorghum forage is very important. You can eliminate much of the prussic acid danger if the sorghum is harvested when matured and well cured in small shocks. All sorghum plants within a variety or strain may not lose the same amount of their prussic acid content. Well-matured sorghum, harvested, shocked immediately and cured six weeks, lost 91.4% of its prussic acid. Allowing the cut material to lie three days before shocking, it lost 79.5%, but curing this material for six weeks in the shock, it lost 95.7% of the prussic acid. Allowing the cut forage to lie before shocking may enable the farmer to utilize the sorghum forage sooner than if he shocked it immediately.

The maturity of the sorghum plants influence the prussic acid content. Sorghums are relatively higher in prussic acid from the early seedling stage up and in-

cluding the fertilized stage. From the time of seed formation to maturity, the prussic acid content becomes considerably lower. Not all sorghum varieties or strains or all plants in a mixed variety react similarly. There may be varieties or plants in varieties that may reach the maximum prussic acid in the early seeding stage, while others may not reach their respective high acid content until the fertilization stage. This makes it practically impossible to make a recommendation as to when they may be safe to pasture. But since the prussic acid content of all sorghums is considerably lower at the mature stage, the farmer should plant and grow only those varieties that will mature in his locality. Growing unadapted varieties that will not mature increases the danger of utilizing the cured sorghum forage.

Prussic acid content in sorghums is a heritable factor and not due entirely to climatic and environmental conditions as we were led to believe. Since prussic acid is a heritable factor, it is possible to develop sorghum strains low in this deadly acid. The results proved so satisfactory that in 1935 a low acid Dakota Amber cane (Number 39-30-S) was released to farmers. This strain was the first of its kind to be released in the United States and possibly in the world. It is the hope of the Agronomy department at State College to breed and release only sorghum varieties or strains for fodder and grain production low in their respective prussic acid content. The production of low acid sorghums that mature uniformly, harvested at the matured stage, and well-cured in the shocks will eliminate considerable forage poisoning. The farmer will have some assurance when he produces low acid sorghums as compared to mixed varieties. Uniformity in maturity and low acid content are the greatest factors in eliminating this dangerous risk.

They Did It Themselves

Condensed from American Agriculturist

A. G. Newhall

WHEN a government bureau drives out the cattle tick, or cleans up hog cholera, or eliminates TB, or the White Pine Blister rust, or the common Barberry from an agricultural region we no longer exclaim over it. We just admit it a good job well done. But when a local organization of growers, without one cent of government funds, without any law enforcement backing, and without any training or experience, succeeds in putting over a township-wide campaign to eliminate a serious plant disease, that is something to excite our genuine interest.

What you are now reading about took place last spring up in Wayne County, N. Y., where about 1,000 acres of muckland are devoted to onion culture. One of the serious hazards in raising onions is the ever-present menace of blight, or better called "mildew." In 1937 nearly 30% of the crop was destroyed by this close relative of the late blight of potato. Spraying or dusting, though tested out many times, has never proved very beneficial. Whenever we have a summer with more than average rainfall in a month's time mildew makes its dreaded appearance.

Not many years ago two Irish pathologists, Murphy and McKay, pointed out that the fungus causing onion mildew lived over in the bulbs of certain perennial onions variously called "topsets," "Egyptian," "Welch," "multipliers," "winter," or "poor man's" onions. The full significance of this was not realized for years because of a general belief that few topset onions were grown in New York State, and these not close enough to the commercial crop to be of any importance. The author shared this view until 1937 when the spread of mildew in certain districts pointed unmistakably to certain local backyard plantings of diseased topsets as primary sources of the mildew fungus. A half day's search in the backyards of twenty-two homes at Marion, N. Y., in June revealed 17 perennial plantings, nearly all diseased. One of these plantings was in the garden of C. B. White, prominent muckland grower, who happened to be president of the Marion Chamber of Commerce that year. He had been steadily reducing his onion acreage for

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years, because mildew always came so early and cut the yields so much.

At a meeting held in the fall of 1937 under the auspices of the Marion Chamber of Commerce and largely attended by muckland vegetable growers, it was explained how the mildew lives over, how the spores of the fungus develop by the millions on the leaves of these perennial onions in May and June and how the spores had been caught in special traps exposed from the cockpit of an airplane flying 1500 feet over diseased onion fields, and how these spores had germinated the following night thus showing that they were viable and able to spread the mildew.

This roomful of growers then and there decided to try and rid their community of all the topset reservoirs of mildew they could find before the first of May, 1938. A steering committee composed of Assistant County Agent Lloyd Curtis, President C. B. White, G. G. Stoll, the high school agricultural teacher, and Dan W. Giebel, president of one of the local cold storages, together with ten other public spirited growers, mapped out their campaign. Each agreed personally to canvass a given portion of Marion Township and to induce everyone to eradicate all garden plantings of perennial onions. All were greatly surprised to find that the canvassing took only about half a day, and most of them were astonished at the number of plantings found which varied from two to ten apiece. The total for the township, exclusive of the village of Marion, was 49. The village of Marion was canvassed by the boys and girls in Mr. Stoll's agricultural class. This canvass revealed a total of 33 plantings in the village gardens, which is a surprisingly high percentage, as the total number of premises is believed to be under 200.

The value of the campaign was measured in two days. One was by a general survey of 100 fields of onions. On August 26th, only 28% of the fields in the township showed mildew, while 68% outside the township were diseased. The other way of estimating results consists of the experience of individual growers. Mr. White, after destroying ten plantings within a radius of one or two miles of his muck, was able to raise the healthiest, finest crop in seven years yielding over 700 bushels to the acre. Mr. Orin Crane's field was almost within the village limits of Marion. Last year his crop was a complete failure from mildew, but this year after removal of 33 plantings in the village he was able to harvest approximately 400 bushels per acre, in spite of sowing very late in May.

Just how far eradication of top-

sets should be pushed throughout the State for good commercial control of onion mildew no one can say definitely. It should be at least county-wide in many counties. But in some seasons even this may afford inadequate protection for there is some circumstantial evidence that under ideal (foggy) weather lasting several days the spores of the mildew fungus may be carried many miles through the air. It is of primary importance to eradicate all local plantings of topsets within a mile of commercial fields. Wild onions or leeks are not subject to mildew.

The job of canvassing and asking people to eradicate their garden plantings would seem to be up to the onion growers themselves. No one else is as interested in protecting the commercial onion crop. The value of most garden plantings can usually be covered with the promise of a bushel of good keeping onions in the fall. Most folks are glad to cooperate when they understand thoroughly and are approached in the right way.

Sawdust Concrete Has Advantage

Makes Light, Strong Building Material

Condensed from The Washington Farmer

STRANGE as it sounds, concrete that looks like whipped cream in the mixer and is only one-third as heavy as ordinary concrete is a practical reality. It is cement-sawdust concrete. If properly mixed and applied, it is said by Russell R. Skelton, New England engineer, to be suitable for a variety of farm construction requirements.

Using sawdust in place of sand or gravel, this cement is fluffy, strong, warm and an excellent insulating agent, water-repellent, easily finished to a smooth surface, fire resistant, resilient, will hold nails and screws and can be sawed with an ordinary carpenter saw. This feature makes it easily installed into special places where it must be shaped to fit.

The sawdust should be that from the main saw, rather coarse in size and at least one year old. White pine, hemlock or spruce sawdust gives the best results. Fine-cut sawdust and that from hardwood trees is not recommended. Screen the sawdust through an ordinary mason screen to take out pieces of stringy bark.

Ordinary concrete-making equipment is all that is required, plus clean water, cement and the

Reprinted by permission from The Washington Farmer, March 30, 1939

sawdust. It is essential that the material be mixed in a power mixer, as hand mixing does not produce the results desired with cement-sawdust concrete. Use first a wooden float, then a steel float, to finish the surface. A light wooden tamper should be used to compact the material before finishing.

Walls and footings of cement-sawdust concrete are suitable for one-story buildings, but are not feasible for higher buildings, since considerable thickness would be required. This type of concrete finds an ideal use in floors, such as those in poultry houses and dairy barns, and in various small jobs.

For foundations, place the wall directly on the footing, which has been poured in the ordinary manner. In order to eliminate frost heave and cracking, the footing should be about three and one-half feet below the ground level. The outside of the trench should be back-filled with sand or gravel, to insure good drainage. A wall six inches thick is sufficient for a one-story building. A two-inch rock projecting up out of the footing will make a good bond with the wall.

Floors may be laid on cinder or gravel base, or over an old concrete or wooden floor or new flooring of inexpensive lumber. Wooden subfloors must be clean, dry and painted with a heavy coating of roofing paint containing asbestos in asphalt. This paint is to prevent decay from moisture.

For poultry house floors, a thickness of three inches is recommended; six inches for barn floors. Floors should be laid in two courses, two-thirds of the thickness in the first course, with the top third as the surface course. The pouring of the two courses must be continuous to insure a good bond.

Slabs larger than 12 feet square should not be poured. Divisions may be made by use of a timber header, the same as with other concrete. A slope of one-half inch in 10 feet is suggested if the surface drainage is desired.

Weight of loose sawdust (pounds per bushel)	Per cent moisture	Water to be added per bag of cement, Poultry House floor	Water to be added per bag of cement, Barn floor
10.5	0	10 gals.	9 gals.
12.0	25	9½ gals.	8½ gals.
13.75	50	9 gals.	8 gals.
15.5	75	8¼ gals.	7½ gals.
18.0	100	7 gals.	6¾ gals.
22.0	125	6 gals.	5¾ gals.
23.8	150	5¼ gals.	5 gals.
25.0	175	5 gals.	4¾ gals.
26.0	200	4¾ gals.	4½ gals.
27.5	250	4¼ gals.	4 gals.

Accurate measurement of materials is vital in cement-sawdust concrete. For poultry house floors use one volume of cement to 3½ sawdust, loose measure. For barn floors, a one to three mix is suggested.

Most important single step in the entire handling of cement-sawdust concrete is getting the right amount of water in the mix. Sawdust varies widely in water content, and will absorb and hold more than its own weight in water.

Directions for using the table in determining the amount of water required. Take a bushel of sawdust from the pile and weigh it. Weigh two more samples from other parts of the pile. Average the weights. Suppose the average is 22 pounds. That indicates that the sawdust has a moisture content of 125 per cent. Six gallons of water per bag of cement should be used in making a poultry house floor mix.

Mix the cement and sawdust dry in the mixer for half a minute, then gradually add all the water, and mix for at least four minutes. When considerable rubbing or scouring wear is expected on a floor, the surface course should contain some sand. For poultry house floors use one volume of cement, 1½ of fine sand and 3½ of sawdust; for barn floors, one of cement, two of sand and three of sawdust. Water requirement is the same as if no sand was used.

Keep the cement-sawdust concrete damp for at least a week after pouring. After about 12 hours, cover it with an inch of loose sawdust and sprinkle with water. Do not walk on the floor in the first week. After a week remove the sawdust and allow to dry for three days. The floor can now be used, and light equipment installed. No heavy loads should be placed on the floor for 28 days. This type of concrete should never be built when the temperature is likely to be below 50 degrees F. for the full seven-day curing period.

Materials required to make 100 square feet of floor: Three inches thick—7 bags of cement, one cubic yard of sawdust (21½ bushels). If sand is used in the surface course, 3½ cubic feet of sand. Cost of material, $5. Four-inch base course—10 bags of cement, 30 cubic feet of sawdust. Two-inch wearing course—5 bags of cement, 14 cubic feet of sawdust, 9 cubic feet of sand. Total material cost, six-inch floor, per 100 square feet, $10.

Better Range Management

Condensed from The Poultry Item

C. E. Lee

FOR some years past we have been experimenting with different sizes and designs of range shelters. Some of this work has been done at the Research Farm and some of it we have carried out through the co-operation of commercial poultrymen interested in this problem. In this way a great variety of range shelter designs and of range and flock conditions have been included.

It has gradually become apparent that for best results, on any range, the four points most essential in securing lower mortality, better health and development of birds are as follows:

No. 1. Fewer birds per range shelter.

No. 2. Greater distance between shelters on the range.

No. 3. Moving shelters more often.

No. 4. Better sod management.

It was found that under No. 1 the maximum standard should be not over 100 birds per shelter. For No. 2, it is difficult to make a general rule on account of the great variation in soil and sod conditions, but it seemed that 250 ft. proved about the minimum space standard under most conditions.

Under No. 3 it was found that moving the range shelters less than every four weeks increased danger of mortality and lowered the condition of the birds. In this connection it is interesting to note that in England it is a very common practice for the shelters, which are there called "night arks" to be moved a short distance every day. These shelters are generally mounted on wheels so that moving is relatively easy.

Under No. 4 it was found that many poultrymen do not pay sufficient attention to establishing and maintaining good pasture conditions on their poultry ranges. In some cases this is difficult, owing to a very sandy soil, but in a great many cases the soil is adaptable and excellent pasture conditions could be maintained, except that poultrymen have neglected it. The selection of grasses, the proper preparation of the soil, and a definite program of management after the proper sod is established are necessary if we are to get maximum returns from the range, and greater security against disease and parasite infestation. Where the business is large enough it means a tractor and necessary equipment to pre-

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pare and seed ranges or to renew old sods, where plowing is impractical. Mowing is very important, too.

Grass Range

A good range pasture can be an extremely valuable asset. Good range pasture may result in reducing the feed bill per pullet from 8c to 10c per bird according to the experience of some eastern poultrymen. Where a large number of pullets are being raised, this might be a considerable item.

Far more important, however, in our opinion, is the fact that unquestionably a supply of fresh, immature grass is the finest kind of supplementary feed that can be produced, being particularly high in many of the essential vitamins and minerals. This same grass at a later stage is worth very little, and in case it is dried and stringy, may be a positive detriment.

In order to have a steady supply of immature grass on the range, it is necessary to mow the range frequently so that new grass will always be coming up from the bottom. Failure to mow the range frequently means grass of little food value, and also may serve to intensify the danger from parasites and disease.

When grass is mowed frequently, the stubble is short, stiff, and stands up straight. Droppings from the birds work down in this stubble and are soon lost sight of. The birds do not come in contact with the contamination that they will where the grass is long and gets bent over and matted down.

At the same time, young grass is kept growing by the frequent cutting and there is always fresh, high potency, immature grass for the birds to eat. They will eat a surprising quantity of it, whereas if the grass is allowed to grow up without mowing, their consumption falls off very rapidly as the season advances, and what they do eat may be so stringy that it accumulates in the crop and causes pendulous crop.

Some years ago the alfalfa enthusiasts recommended this forage plant so highly that many poultrymen used it for the poultry range.

However, alfalfa has one very bad feature. Where the crop grows well a dense growth is obtained which allows little or no penetration of the sunlight to the soil. Furthermore, chickens using the alfalfa cause the plant to be bent over and flattened down and droppings accumulate on this matted mass so that contamination is right there in contact with the birds at all times.

Very much the same condition exists where clover is used unless some of the shorter kinds of clover are sowed which do not make such a dense growth and which allow some penetration of

the sunlight. Even in such cases it is necessary to pasture the range rather closely in order not to get too dense a growth of the clover.

Our experience has been that usually better pullets can be raised on a range covered with ordinary weeds, with stiff, coarse stalks, particularly where the range is mowed with reasonable frequency, rather than on either an alfalfa or a clover range.

Again and again we have seen intestinal coccidiosis and paralysis play havoc with pullets on an alfalfa range, whereas birds of the same stock running on a weed or timothy range, frequently mowed, developed no sign of the trouble.

We believe emphatically that, from a sanitary standpoint, both alfalfa and clover are thoroughly undesirable and that the poultryman is very much safer if he will stick to timothy or a mixture of timothy, bluegrass, and meadow grass, equal parts by weight of each being used when sowing the seed.

It is interesting to note from the experimental work done by Dr. Schaible, at Michigan Experiment Station, that immature timothy ranks extremely high in vitamin potency, excelling alfalfa and most other forage plants. Kentucky bluegrass is also of extremely high potency. As these grasses mature, however, they lose potency much more rapidly than alfalfa and presumably clover. The point is to mow frequently so that young grass is kept constantly spouting up from the bottom.

It has been said for many years and is universally acknowledged by anybody who has had any experience in disease control that one of the most important points is to let the sunshine at the surface of the ground. When clover and alfalfa are raised the ground gets mighty little sunshine.

Where timothy and other coarse grasses are used, the surface of the soil is pretty much exposed to sunshine every time the grass is mowed.

The Bumblebee

Condensed from New England Homestead

Emil Kellstrand

ONE of the most interesting species of our social insects is the bumblebee, since it maintains itself as a colony in which the queens and the workers have a part in rearing the males and females so necessary to the survival of their race. Although its social life is not so highly developed as that of its cousin, the honeybee, it is somewhat similar.

The honeybee, as is well known, maintains its colony the year around, storing honey in the summer to live on in the winter. Bumblebees, on the other hand, remain as a colony only during the summer or growing season. Each fall all the members of the colony die except the fertilized females. The latter hibernate through the winter, and upon their successfully surviving this period depends the continuance of their race.

During the first warm days of spring the large beautiful bumblebees may be seen on the early blooms. These are all queens, that is, fully developed females, and are the only living bumblebees during this stage of the season. These queens, who have just awakened from their long winter sleep, apparently are in need of a few days of recuperation, because for a while they just roam the fields, sipping nectar from the early spring flowers. The instinct to start a colony is now predominant. Soon they may be seen buzzing around everywhere, frantically searching for an old mouse nest, which for them constitutes an ideal summer home.

Upon finding a suitable home, the bumblebee promptly proceeds to organize her new establishment. First she builds a large cup to hold honey as food on cold days when she cannot fly. Next she builds some little cell cups in which she puts a little pollen mixed with honey. In this mass she lays her first eggs. As these eggs must be kept warm to insure hatching, the mother queen sits on them in much the same manner as a mother bird. In this process she is aided to some extent by the insulation afforded by the finely chewed up grass and hair of which the old mouse nest is made. The young larvae must be fed on rich food of pollen and honey, so the mother bee has to make many trips to the flowers in the neighborhood for this precious food.

Three to four weeks of ardent

Reprinted by permission from the New England Homestead, Springfield, Mass., March 11, 1939

care is required of the bumblebee mother before her first worker offspring has grown enough to help with the housekeeping duties. When a few of the young workers finally are ready to help provide the colony with food, and help with the nursing of their younger sisters, the mother seldom needs to leave the nest. She may then spend her whole time laying eggs and caring for her constantly increasing brood.

As soon as the young bumblebees are full grown, they crawl out of their little cocoons. These discarded cocoons then become handy little storehouses for nectar. By the middle of summer, the little colony has usually reached its peak of prosperity, and may have as much as two or three tablespoons of honey, 75 to 100 members, and stores of pollen.

Soon the old queen lays batches of eggs designed to produce males and queens. The young queens forage but very little, and the drones, or males, do absolutely nothing to maintain the colony. The sole function of the males appears to be the fertilization of the young queens.

The workers, who are sexually undeveloped, rapidly die off. By the time the sexually-matured male and female bees arrive on the scene there are but few workers left. The young queens and males soon use up all the stores of honey. They then desert the nest and live on the flowers, taking shelter almost anywhere.

Mating takes place in late summer or early fall, and all of the males die off. Only the young females live through the coming winter by hibernation. They find shelter in the ground, under logs, piles of leaves, and similar places, emerging the following spring none the worse for their experience. It is interesting to note here that the bumblebees and honeybees are cousins in the sense that they have a common ancestor, but during the formative stages of evolution they chose, so to speak different directions of development. It was necessary for both to invent a scheme that would enable them to survive the hard winters of the northern climate. By the slow process of natural selection, the bumblebee hit upon hibernation as its solution to the problem, and is now dependent on this for its continued existence.

The honeybee chose to follow a different course, and developed the scheme of storing honey to feed on in the winter, maintaining a colony of from 10 to 20,000 workers and their one queen throughout the winter. They keep alive by huddling close together, eating honey, and generating the necessary heat to keep themselves warm. If they fail to store enough honey to carry them through, they will all die.

It is this highly developed instinct of storing honey that the modern beekeeper uses to his advantage when he manipulates his bees for the production of honey for himself. It is very fortunate for mankind that the honeybees chose this particular scheme for the existence of their race, for otherwise man would never have had delicious, natural, sweet honey for food. It also made the honeybee suitable for domestication.

Bumblebees, because of their scheme of hibernation which makes it necessary for them to store honey only from day to day, are therefore not suitable for domestication. They can, however, be made an interesting hobby, and kept for the summer months. You may make miniature beehives with an entrance large enough to enable one of these large bees to pass in and out. The next step is to find a suitable bumblebee nest, as previously described. Wait until evening when all the bees are in, then take your little beehive over to the nest. After a little practice you will find it easy to roll the whole nest, comb, bees, and all, into your small hive, which, by the way should have a removable cover. After you have all the bees in the hive, close the entrance, put the cover on, and bring them home. The hive may be placed in any convenient location.

Upon opening the entrance next morning, you will find your little colony of bumbles starting housekeeping in their new home, flying in and out, and tending to their assigned duties. It should be remembered, however, that this will work better if the nest of bees is taken from a distance of a mile or so.

As a boy in my native Sweden, I often had from five to ten little colonies such as the one described, keeping them in my garden. Of course the bees would all disappear in the fall, so that I had to find new nests each spring. Finding a bumblebee nest is not very difficult if one roams around fields where there are likely to be old field mouse nests. One will find them along the banks of brooks and ditches, under sods, or patches of leaves. Should you step close to a nest, the bees will make themselves known by a loud, angry buzz that you will surely hear. Mark the place, and return in the evening to get them.

Another way to establish little colonies of bumblebees around your home is to put up little boxes, in which you have placed old mouse nests. In many cases the bumblebee mothers will be attracted to these convenient homes and start a nest just where you want them.

Bumblebees should under no circumstances be destroyed, because they are among our most

beneficial insect friends. They pollinate many of our flower plants which are too large to be pollinated by honeybees and other smaller insects, whose tongues are not long enough to reach the nectar in the deeper flowers. They are mainly responsible for the pollination of one of our most important agricultural crops, red clover. The value of this crop alone should encourage the protection of the bumblebee.

Bumblebees are also very valuable to orchard owners during the many cold days of early spring, because they are able to fly at a lower temperature than the honeybee. Bumblebees are protected by a kind of velvety overcoat which enables them to visit flowers when the temperature is as low as 50 degrees, Fahrenheit. Honeybees do not generally visit flowers unless the temperature is at least 10 degrees warmer.

It somteimes happens that one of these large bumblebees will come into a home through an open door, later to be caught on a window where it would soon perish unless assisted to freedom. The loss of one mother bee such as this in the spring, means the loss of hundreds that might have served as pollinators later in the season. Therefore a bumblebee caught on a window, should in some way be assisted to its liberty, just as you would aid a bird under similar circumstances.

Always aim whenever possible to give these useful insects a chance in life, for upon their well being depends, in part, that of the farmer, the gardener, the orchardist, and the breeder of flowers. I think it is safe to state that, without the bumblebee, many of our cultivated, as well as wild, plants would become extinct.

Ducklings on the March

Condensed from American Poultry Journal

L. H. Sweetser

TWO transcontinental highways traverse the Fontana district, and visitors to California make frequent detours along the paved roads of this community to view such rather notable industries as a poultry farm with 80,000 layers; the only government rabbit experiment station in the U. S. and one of four in the world; the world's biggest hog farm with, at times, more than 60,000 porkers; the hundreds of well-kept small farms and poultry plants; and the duckling farm.

Permits to enter the duck farm can be obtained only under special order, but there have been openings left in the fence surrounding the place which allow views of the yards of thousands of Pekins on their leisurely march from the incubator cellar to their Waterloo across the alley at the packing plant.

During their promenade, however, these snow-white bird aristocrats enjoy the fat of the land and the most comfortable living and outing quarters human experience and ingenuity can provide. Their yards are on rolling gravelly soil, kept scrupulously clean, and sheltered by trees and open sheds for shade. Large ponds with sloping concrete shoals give ample swimming space.

In the breeding yards you will see from 400 to 600 young breeders in production, the number varying according to the time of year. During the summer months there is 1 drake to 4 hens; later in the season, 1 male to 3 hens. The normal egg production is from 50 to 60 per cent.

The incubator cellar, concrete with brick "table house" above, has hatching capacity of 11,400 eggs. The room humidity is maintained at from 65 to 70 by sprinkling the floors. Water trays are also kept in the machines.

When hatched, the youngsters are taken to the table house, where they are placed in 56 pens, 65 to a pen. The runway is indoors and the ducklings have access to a hot water brooder. Each unit has one drinking fountain protected with small, upright wire bars. The little fellows can thrust their heads through but can't splatter their home with the inevitable bill shake. Here the ducklings remain 7 to 10

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days. If kept longer, they are apt to develop leg weakness.

From the table house, they are carried to the brooder house in flocks of about 190, three pens from the table house being combined. The brooder house is on the ground level, and has openings leading outside where the ducklings are permitted to run, except when the temperature is too low. Hot water brooders are used.

From the time they reach the brooder house, the ducklings move from one pen to another on their own legs, journeying after a three-weeks' stay in the brooder house to the growing house, where they are gathered in lots of approximately 400 to the pen. Here they have the run of a commodious yard. Inside, 4 parallel hot water pipes run the length of the building, 2½ ft. from the ground, and when required, these pipes are heated sufficiently to take the chill out of the room.

They remain in the growing house 4 weeks, and then "duck-step" to the fattening shed, where they are thrown into flocks of close to 1,000. Here they also have access to large yards. After about 4 weeks in the fattening pens, they weigh 5 lbs., and take their final journey of a few feet to the packing plant, from which they soon emerge as prime market ducklings.

The entire plant is served by carriers, one rail extending from a central milling plant where the grain mash is prepared. The feed is almost wholly grains, with alfalfa for greens. The growing birds are particularly free from disease, except that the protein ration has to be watched to prevent leg weakness.

The plant is laid out, with alleys, gates and labor saving location of supplies and appliances, so that little man power is required for operation. More than four men can seldom be seen on the premises. A gate is opened, and the ducks themselves do their own transferring from one pen to another. They vacate a unit so it may be readily cleaned; shelter themselves from hot sun or from chilling winds as they see fit; and eat themselves from the mash shoveled onto feeding boards.

So that swimming pools might be kept supplied with fresh water, wells were dug 8 ft. in diameter and 40 ft. down. There are 7 of these wells.

Hog Cholera

Condensed from Farm and Ranch

Dr. Frank R. Jones

Formerly Extension Veterinarian Texas A. and M. College and Inspector-in-Charge Hog Cholera Control, United States Bureau of Animal Industry

HOG-CHOLERA is caused by a specific filterable virus. This means that the germ is so small that it passes through the finest filters and that it cannot be seen with the highest power, modern microscope. The blood of a cholera-infected hog contains the virus of hog-cholera and, of course, all of the body organs and tissues and secretions of the body, especially those from the eyes, the nose, the urine, and the feces, contain the virus or causative agent of hog-cholera. Therefore, the premises occupied by cholera-sick hogs become contaminated with virus, and the virus may be carried from one farm to another on the shoes of persons visiting these premises, on farm wagons, by dogs, birds, etc.

The period of incubation of hog-cholera is usually from three to seven days; that is to say, a hog may be infected with hog-cholera from three to seven days before clinical symptoms of the disease are apparent. This is responsible for many animals, which are apparently well at the time of vaccination with anti-hog-cholera serum and hog-cholera virus, later becoming clinically sick with the disease, which usually results in death.

The symptoms of hog-cholera vary greatly, due to the type of the disease and the body resistance of the animals. One of the first warnings of hog-cholera in a herd is finding one or two animals slightly off feed; within a few days, a large number of other animals develop symptoms of the disease. Therefore, any sick hog in a herd should be viewed with suspicion and should be immediately isolated and carefully observed. If the animal does not recover or show marked indications of recovery within a day or two, it may save many dollars to have a post-mortem examination made by a qualified veterinarian at once, for the purpose of making a positive diagnosis.

The salient symptoms of hog-cholera are as follows:

1. Extreme high body temperature from 104° to 108° F. and loss of appetite.

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2. As the disease progresses, marked weakness.
3. A wobbly gait.
4. Difficult breathing, sometimes thumping. Red and watery eyes, followed by a gumming up of the eyelids.
5. Constipation followed by a profuse diarrhea.
6. In a very acute type of hog-cholera, the first symptom noticed is the death of the animal.
7. Any hog found dead should be immediately examined to determine the presence of the disease.
8. In chronic types of hog-cholera, the animals may live from ten to thirty days.

Prevention: When the hog-cholera is known to exist in the community, every precaution should be taken to avoid carrying the disease to your premises and to the swine herd. Anti-hog-cholera serum, used in conjunction with hog-cholera virus (known as the simultaneous treatment), is the only known method of permanently immunizing swine against this disease.

Anti-hog-cholera serum and hog-cholera virus were developed by scientists of the United States Bureau of Animal Industry, Department of Agriculture, some twenty-five years ago. The use of anti-hog-cholera serum and hog-cholera virus is so common today, throughout the swine-raising belt of America, that no swine owner questions the efficiency of this treatment.

Anti-hog-cholera serum may be used alone, without hog-cholera virus, to immunize hogs temporarily, but it must be remembered that the serum-alone treatment cannot be depended upon to confer immunity except for fifteen to perhaps thirty days. This makes this method of treatment impractical and unduly expensive.

All anti-hog-cholera serum and hog-cholera virus offered to the American farmer today is produced under the direct supervision of veterinary inspectors of the Bureau of Animal Industry, United States Department of Agriculture, and is therefore theoretically of standard quality.

Available records seem to indicate that at least 40 per cent of the hogs vaccinated in the United States today with anti-hog-cholera serum and hog-cholera virus are vaccinated by the owners. Other farmers choose to employ veterinarians to do this work. The vaccination of hogs is not a complicated procedure. It is an operation that requires only ordinary care and intelligence and attention to instructions.

It must be remembered that hogs that have passed through public sales barns, railroad yards, railroad cars, or that are picked up promiscuously through the countryside, are usually exposed

to hog-cholera, and should be considered exposed, and immunized with the simultaneous treatment to prevent the appearance of the disease and an outbreak of hog-cholera in a community that may be otherwise free from the disease.

The control of hog-cholera is entirely in the hands of the farmers. It is they who must prevent carrying this disease from one farm to another and transporting hogs from one community to another without due care to prevent the spread of the disease.

A Story on Mink Farming

Condensed from The Rural New-Yorker

Hugo Zichner

WHEN you observe elegantly dressed women in expensive mink coats you may wonder where all these mink come from. The time when our chicken houses were robbed by these marauding mink is long past. Losses from this source are small, so it is obvious that these valuable fur bearers must now come from another source. Mink are now raised mostly on small farms operated independently or in connection with other farms. The trend seems to be that they are raised more and more in connection with regular farms. The farmer realizes that any additional revenue or "crop" is very helpful.

The raising of silver foxes as a main, and as a side line, has been and still is a good source of revenue for a great many persons. The fundamental soundness of fur farming is best attested by the fact that it grew to a major industry during the depression.

Furs have been worn since time immemorial and will be worn as long as any are available. We will most likely in the future be able to raise a few additional fur-bearing animals that, so far, have defied all efforts of the fur-farming community, and that only propagate successfully in the wild.

Mink can now be produced in captivity which are far superior to the trapped ones and a good profit can be made.

Mink are housed in wire cages, being kept in individual pens from the moment that they are grown up. Severe biting and losses would otherwise occur. A pen consists of a run and a nest box. The run is about 21 by 21 inches in cross section and five feet long with a door for feeding and cleaning on top. A drinking vessel is also provided. The ken-

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nel is about the same height and width as the run. Its depth is about 14 inches. A removable wire lid on top prevents the mink's escape. Essential features of the nest box are: The rain must be kept out; ventilation is necessary and the bottom should be provided with some holes or other drainage facilities. The nest in these kennels has to be kept dry. This is one of the most important requirements to keep a properly fed mink in good health. More mink die through neglect from wet nest boxes than from any other source.

The mating season for mink lasts, roughly speaking, from March 1, to March 30. The male may be carried to the female, or the other way around. The matings are recorded and properly entered. The animals are separated immediately after the mating. The young ones are born on an average, 52 days later. The period of gestation varies between 42 and 78 days. The nest boxes should be cleaned a few days before the anticipated arrival of the young and the kennels be filled with soft hay. The young litter should be left entirely alone for the next few weeks. At the age of four weeks the mother will start carrying food to her offspring which, from now on, develop rapidly. At the time of their birth they are about the size of a newly born rat and look like one, too. When they are healthy, their skin is pinkish and their diameter is about the size of a pencil. At the age of four weeks, they are about four inches long and three-fourths inch in diameter.

At this stage they become very ravenous eaters. They quickly learn to lap from dishes containing a mixture of milk and eggs and also eat the more solid food consisting of 80 percent ground fish or meat, 15 percent cereals and 5 percent vegetables. The solid food has the consistency of a hamburger. Growing mink should be fed all they want to eat.

By July 1 they are weaned. Failure to do so will endanger the mother, as the young males by now are larger than their mother. Their continued nursing will weaken her to such a degree that nutritional anemia develops which, in extreme cases, may even prove fatal. Fresh drinking water should be kept before the mink at all times. Protection against sunlight should also be provided during the hot spells. Starting from September 1 all mink are fed only once a day until pelting time which is around November 15.

What Is Size?

Condensed from Sheep Breeder

J. F. Walker

THE other day I chanced to be at an auction sale of sheep. Many buyers were present and interest was centered on a lot of ewes carrying a considerable growth of staple and showing an advanced condition of pregnancy. Most of them were a trifle long in the leg as well.

Penned beside them was another lot, the same age and breeding but in some three months less fleece and due to lamb about a month later than the first lot. They were also shorter in the leg.

It was very interesting to listen to the comments of prospective buyers on the relative merits of these two lots of ewes as to size, and value. Not one but placed the first lot as much the largest and in the sale they backed their opinion by paying considerably more for them than for the second lot. Yet, put in the same condition, the short-legged second lot would have outweighed the others and been the best buy at the same price.

At the recent International we showed a pair of yearling Corriedale rams, one a short legged, low thick one—the kind we like; the other a rangy, upstanding ram, carrying a longer fleece. Everybody guessed the last ram anywhere from twenty-five to fifty pounds larger than the first one. As a matter of fact, the blocky ram weighed 187 pounds and the other 185 pounds.

It is very apparent that size, to the average person, is measured by height, length and appearance, rather than in an attempt to visualize body size and conformation where weight is determined. Long necks, long legs and long fleeces are given more consideration than well sprung ribs, wide loins and deep bodies which after all is what the packer pays for.

It is an unfortunate situation for any breed to find itself in a position where it is judged from the viewpoint of the average person as to size. Long legs and long necks go hand in hand and do indicate something, but the things they indicate are exactly the things that the feeder and the packer don't want—namely, a hard doer and poor finisher with excessive percentage of waste in dressing. There are exceptions, but the number of such are very limited.

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A long leg is generally associated with a leg of mutton not well filled in the twist. Nearly always a shallow, light body is also found accompanying the long leg. A long neck, if heavy, produces an excessive amount of "neck steak" which hardly ranks in quality with the meat found at the other end of the spinal column. If this long neck is light, one will find a poor feeding, weak constitutioned animal every time.

Why is this false standard of size being perpetuated? There are just two reasons; the first is to deceive the buyer or more often one's self. I do not feel that many are guilty of trying to defraud a purchaser, but a lot of purebred breeders find it easier to sell such individuals than those of more compact conformation and, consequently, follow the lines of least resistance. Where scales are not available, it is very easy to produce 200 pound yearlings given enough wool, leg and neck, and when lambs of this kind go to market it is again easy to blame "short weights" as the reason for their failure to weigh up to expectations.

The second reason for the preservation of this type of sheep is the one generally given—that on western ranges a long leg is necessary to permit sheep to travel the distances required or get over rough grazing lands. This theory is given considerable credence. At one of our leading shows, the judge stated that he wanted a sheep that could go out in the spring and come back in the fall and made his placings accordingly. Many western men make the same statement. Most of these men never had any experience with anything else than sheep of this type and their convictions are the result of a line of reasoning rather than actual demonstration.

A sheep is a sheep and a leg is a leg the world over and if long legs are necessary in one state or one country they certainly should be essential in every country where sheep are compelled to travel long distances, or in rough countries. What do we find?

In New Zealand the "rough" country is as bad as anyone encounters in the West. Out of this region the writer secured ten head of Tasmanian type Merinos that had been trailed as far as any western band would travel. They were mostly short in the leg and the shorter legged ones were in the best condition. Nobody there seemed to feel that long legs were essential to successful herding.

In Australia we saw bands of sheep on the semi-arid sections traveling up to twenty miles a day for feed and water. These sheep were deep bodied and only had a moderate length of leg. Those men talked about the set of leg and muscle to propel it

rather than length.

In South Africa we trailed for two days with a band of ewes being moved over two hundred miles from winter to summer range. The short-legged, deep-bodied kind were out in the lead and doing the best on the trail.

Last fall considerable territory was covered in the West looking for feeder lambs. The best and heaviest lambs we secured came from a short-legged band of ewes running in as rough a country as any we encountered.

If size is not dependent on long legs, neck or fleece, what is the yardstick by which it should be determined? The first and most accurate is the scales. A pair of scales should be in every judging ring for the benefit of the judge who looks largely to size. It would cause a tremendous "shrink in shipping" in a lot of cases. Lacking scales, the important thing to remember is that width, length and depth of body determines weight. Firmness of flesh is another important factor. This should not be confused with excessive fat put on for show ring competition, but as applied to an animal capable of breeding.

In a letter this fall a breeder states that he purchased a ram weighing 335 pounds and was obliged to take off seventy-five pounds before the ram was able to function as a breeder. This ram was a 260 pound ram and no more. Loaded with seventy-five pounds of excess fat he should have been exhibited in a side show with the 3,000 pound ox, rather than in a breeding class.

Lastly, what is proper size? The sheep that will eventually win out is one that has the ability to bring a lamb to popular market weight in the shortest possible time and at the most economical rate of gain. These two factors determine the profit to be hoped for. Rapidity of gain is very desirable; cost of gain is absolutely essential.

The ewe best qualified to serve as a mother of such a lamb must be roomy enough to carry one or two lambs and have feeding capacity to develop the embryo and to produce milk to carry them on later. Very little milk is secreted in the neck or legs. It requires deep, thick bodies to store the organs capable of performing these services. Incidentally she should also possess the ability to produce a reasonable amount of wool.

The ram should be of the same type and were I to choose between two rams, one of which went to 100 pounds at four to five months of age and never weighed over 150 to 175 pounds, and a slower maturing big raw-boned lamb that eventually reached 250 to 300 pounds, I would take the first one every time.

A weight of 150 pounds in a ewe in good breeding condition should be ample to meet any requirement asked of her, always provided she is the proper type. Twenty-five to fifty pounds more in the ram is sufficient to perpetuate this size. A few breeds have higher standards of size than the above. With them no quarrel is found. Their blood may be necessary to raise a lot of commercial flocks to the necessary standard. It is very significant that these breeds have, within the past decade or two, very materially shortened their leg and neck and widened and thickened their carcass. These breeds look much smaller than they did twenty years ago, but some have actually gained in weight.

Size must always mean the number of pounds an animal can draw down on the scales, rather than the number of boards it can look over in a fence. Long necks and legs are merely "bones of contention" that eventually will be eliminated from every good breeding flock either purebred or commercial.

Farming the Land and Keeping the Soil

Condensed from The Ohio Farmer

L. D. Baver

Professor of Agronomy, Ohio State University

MOST Ohio farmers have experienced the high productivity of virgin land or "new ground" and have observed a gradual decline in the soil's ability to grow crops. They have watched the soil deteriorate and become less productive in spite of better varieties, seeds, fertilization, and methods of culture. What have been the causes of these changes in the fertility and productivity of the soil? Perhaps a simple analogy will illustrate the factors responsible for soil deterioration.

The soil can be considered as the "bank" of agriculture. Soil fertility is the farmer's checking account; and, when land is cultivated and cropped, there is considerable drain on soil fertility. Every crop that is grown and removed from the land is a "check" drawn on the fertility account of the soil. Organic matter, nitrogen, phosphorus, potassium, calcium, and other nutrients are withdrawn. The soil becomes compact, exhibits poor tilth, and the bank account is gradually depleted. Unless the farmer makes

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another deposit in the bank, plants will not grow successfully because of a lack of nutrients and of the unfavorable physical condition of the soil. In other words, the fertility removed by growing crops must be replaced by fertilizers, lime, green manures and plant residues in order to maintain soil productivity.

Every bank account is subject to taxation. Likewise, soil fertility must pay an annual tax in the form of leaching losses. Leaching takes place in the absence or presence of crops; and, like taxes, the farmer cannot eliminate these losses. Leaching took place before the land was cultivated, and it will continue to remove a small amount of nutrients from the soil each year. Similar to the crop removal losses, the leaching factor in soil deterioration can be offset by correct fertility practices.

If a farm happens to be on rolling land, the fertility of the soil will suffer additional losses thru soil washing or erosion, which may be compared with the embezzler who steals a little money from the bank each day until he is caught. In many instances, the farmer does not realize that soil washing is removing the fertile topsoil from his land. He undoubtedly notices the clay spots and small gullies in his fields as they first appear, but does not recognize them as evidence of the thief of soil fertility, EROSION. It is not often realized that erosion is deteriorating the soil until crops fail to grow or numerous gullies make tillage operations difficult.

How serious is soil erosion in Ohio? The results of an erosion survey conducted by the Soil Conservation Service in co-operation with the Ohio Agricultural Experiment Station show that nearly 50 percent of the state is subject to at least moderate erosion.

It is obvious that some land must be cultivated in any system of agriculture. The question that each farmer faces is, "How can I farm my land to save the most soil and at the same time produce profitable returns?" Every farmer should be interested in this question. There is sufficient evidence to indicate that the farmer must adjust his farming program to conserve his soil in order for him to maintain a satisfactory standard of living and to produce crops economically. His prosperity will be gauged by the way he handles his soil. In order to answer this question, it is necessary to know the effect of various cropping systems on soil erosion. The first attempt to obtain this information for farmers was made by the Missouri Agricultural Experiment Station in 1917. The 14-year averages of their results are as follows:

Cropping System	Soil Erosion: Tons lost per year per acre	Soil Erosion: No. of years to erode 7 in. of soil
Bare—no crop	41	24
Continuous corn	20	50
Continuous wheat	10	100
Rotation—corn, wheat, clover	3	368
Continuous bluegrass	3/10	3043
Corn following corn (Apr. to Sept.)	15	....
Corn following clover (Apr. to Sept.)	3⅛	....

These losses took place on gently rolling land with a slope of 3⅔ percent, or 3⅔ feet rise in 100 feet. Similar data have been found on the Northwestern Appalachian Soil and Water Conservation Experiment Station, Zanesville, Ohio. Two-year averages on a 12 percent slope are as follows:

Cropping System	Soil Erosion: Tons lost per acre per year	Soil Erosion: No. of years to erode 7 in. of soil
Continuous corn	60	17
Rotation—corn, wheat, hay, hay	8	125
Continuous bluegrass	80 lbs.	25000

These results tell a very important story for the Ohio farmer. In the first place, they show that nature's method of keeping the land covered with grass or trees causes erosion to be so slow as not to be significant. On the other hand the results also point out that the growing of intertilled crops, such as corn, always leads to serious soil losses on sloping lands unless other control measures are adopted. In comparing the results from Missouri on a slope of less than 4 percent with those from Ohio on a slope of a 12 percent slope, it is seen that three times more soil is lost on the steeper land when corn was grown. One cannot over-emphasize the fact that the steeper the land, the more serious will be the erosion under a system of farming that requires cultivated crops.

Erosion is chiefly caused by heavy rains. Under Ohio conditions, the most erosive rains fall in June and July. Immediately, it is perfectly clear why corn land will wash more severely than small grain stubble or meadows. There is little protection in a cornfield against soil erosion resulting from water running down the slope and this is especially true during June and July. How can these facts be used to set up a system of farming on rolling land to control soil erosion?

Every farmer is confronted

with the problem of providing a standard of living for his family that provides some cash income. This income may result from the sale of crops or animals. When means of providing this income must be solved along with the question of conserving the soil, every individual farmer has a problem which is specific for his own farm.

Farmer committeemen in 18 Ohio counties now are completing detailed plans for better land use. Maps are being made which designate areas adapted only for forestry, those which should be in permanent pasture, and those which can produce good yields of field crops. The planning includes recommendations of crop rotations best suited for the different types of soil which are to be tilled. It is expected this land use planning will be completed for every Ohio county within three years.

The first step in planning any farming program to conserve the maximum amount of soil is to decide what land shall be cultivated and what shall be kept in trees or pastures. Almost every farm has certain areas that are too steep or too badly cut up for cultivation. These areas should be planted to trees or grass and kept protected with vegetation at all times. Every farmer should have at least a small woodlot. It may be only a locust grove. Such a grove will provide shelter for some wildlife on the farm, fence posts, firewood, and an excellent means of controlling erosion. These groves should not be pastured.

Some permanent pasture is a necessity on the farm, even tho the only livestock is a few cows and work horses. On farms with large numbers of animals, a considerable acreage can profitably be maintained in permanent pasture. In many instances the land will produce more income per acre in a good permanent pasture than under any other system of cropping. Moreover, all experimental results on soil erosion have shown that a good grass sod is about the best means of insuring effective erosion control.

Nature's original method of erosion control was thru trees or grass. Research has shown that nature's method cannot be improved very much. The farmer can profitably take advantage of this fact in the planning of his farming system. He should keep in mind, however, that nature's method consisted of good grass or good forest. This means that he must practice good pasture management. He must fertilize and lime. He must control the grazing and mow the weeds. If good management methods are followed, that part of his farm devoted to grass will be stabilized against erosion losses and it will produce livestock or livestock

products at a very economical figure.

But, what can be done to control erosion on the land that is cultivated? This is a more pertinent question, perhaps, than the handling of woodlands or pastures. The whole farm cannot be in trees and grass. The answer to this question is found in choosing the correct rotation for a particular farm and in using the best cultural practices for putting this cropping system into operation.

The key to any rotation for erosion control is the sod crop. For example, the data from Missouri show that corn following corn caused almost five times as much erosion as corn following a crop of clover during the months from April to September, the plowing, planting and growing season for corn. Clover sod caused the soil to become better granulated, to absorb more water, to resist washing, and to grow better corn. The length of time a sod crop should be left on the land will probably depend upon the steepness of the slope and the ease with which the soil erodes. On gently rolling land and productive soils, a three-year rotation may be sufficiently effective, such as corn, wheat, clover. On more erosive soils, the length of the rotation should be increased.

The following types of rotation will be satisfactory:

Corn, small grain, alfalfa-timothy, alfalfa-timothy (on land adapted to alfalfa).

Corn, small grain, hay, hay.

Corn, oats, wheat, hay.

Any one of these rotations can be changed to five or six years by allowing the sod crop to remain. The corn, small grain, meadow rotations leave the soil exposed and inadequately protected from the time the sod is plowed for corn until the small grain has established good cover. The corn, oats, wheat, hay rotation is not as effective or thoroly disked at wheat seeding time.

Good Cultural Practices

Having chosen a suitable rotation for erosion control, the following cultural practices will aid to cut down soil losses:

1. Adequate applications of lime, fertilizer, and manure. The success of any cropping system depends upon the amount of a given crop that can be produced.
2. Successful seedings of legumes and grasses.
3. Strip cropping and contour farming. One of the most serious causes of soil washing on cultivated land is the planting of cultivated crops up and down the slope.
4. Terracing. If the slope of the land does not exceed 8 to 10 percent, terraces are effective means of reducing soil losses.

Petroleum and Agriculture

Condensed from New Jersey Farm and Garden

Robert T. Bowman

NO more magic word will be written on the pages of history than the word "oil." One cannot conceive any phase of life that has not been affected, directly or indirectly, by the discovery of crude petroleum, and by the use of its many basic products.

From this carbonaceous mineral, petroleum engineers have worked miracles. A list of the by-products, and the wide range to which industry has applied these gifts of nature, reads like a catalogue of wonders.It may be simple enough for a laboratory scientist to tell us that they have "cracked the molecules of crude oil apart, disturbing the mysterious atomic arrangement of petroleum to arrange the substance in myriad combinations," but we, as laymen, ask the question, "What have they produced and what relation do these products have to our agricultural industry?"

In its simplest form, the process of petroleum refining consists in heating crude oil in the stills to the boiling point, passing vapors from the boiling oil through condensing pipes, and condensing the vapors into liquids. The "cracking" process starts with crude petroleum from which is first produced hydrocarbon gases; light, intermediate and heavy distillates; residues and refining sludges. The process continues to a seemingly inexhaustible array of products.

We are familiar with the important use to which inventive genius has applied gasoline and lubricating oils. Farm life has been revolutionized by these contributions of modern science. For instance, it is unthinkable to conceive of a modern farm without the services of automobiles, trucks, tractors and innumerable other mechanical units of the field and home; machines which are lifeless and worthless without the magic power of gasoline and oil.

These, however, are but two single items in a long list of services which the refining industry renders to the field of agriculture. Our cars run over roads built of asphalt which is one of the principal products from the first residue in the breakdown of crude petroleum. Textile oils, silk oils and wool oils are indispensable aids in the manufacture of clothes. The lotions, creams, toilet preparations and many medicines contain products derived from crude oil.

Modern wax paper wrapping

Reprinted by permission from New Jersey Farm and Garden, Sea Isle City, N. J., March, 1937

for food and other products are impregnated with paraffine wax which is taken from the same fraction as that from which car lubrication oil is derived. A waxy oil is used to surface-coat eggs to retard decay in storage. Cheese is "wiped" with paraffine wax to prevent drying in storage. Vegetables are sprayed with low viscosity oil emulsions to destroy parasites and insects. Studies in this field show that some unprotected vegetables lose from 33 to 85 per cent moisture during one month's storage as compared with 1.9 to 12 per cent when wax-coated. Another "coating" has been designed to protect shrubs which are susceptible to mold or injurious growth while in storage, and for delicate bushes or shrubs which suffer injury during transplanting.

The problem of treating milk whenever odors are detected, particularly in the cream where the greatest odor absorption is found, has been solved by the Agricultural Experiment Station of the University of Tennessee at Knoxville. Technicians at this station found that petroleum white oils act as odor removers, details of which are contained in the Tennessee Experiment Station Circular No. 14.

Trees are sprayed with a heavy kerosene-like oil to kill insects, and an insecticide is used to kill flies. Smudge oils are used in burners for the protection of fruit orchards in times of frost, and oil papers saturated with an asphaltic substance protects plants from the extreme heat of the sun. Kerosene, of course, plays an important part in the war to prevent the development of mosquito larvae.

The production of alcohols which are made by synthesis from cracked still gases, and the increasing production of various chemicals and pharmaceutical products, have made great progress, but, as George H. Mettam, manager of the Standard Oil Company of New Jersey, recently said: "The world can no more tell what future discoveries will be made than the wisest man of 150 years ago could have foretold of the wonders which science has produced from the once mysterious substance—crude petroleum."

At the coming World's Fair in New York, one will see in dramatic presentation industry's part in "Building the World of Tomorrow." Agriculture and all its allied branches will demonstrate their contribution to the forward march of civilization. So, too, the petroleum industry will have its elaborate display which will be sponsored by thirteen of the nation's leading oil companies.

Sodding with Funnels

Condensed from Southern Agriculturist

OF all the methods of sodding used in the Forrest City, Arkansas, Soil Conservation Service project area, what is known as the "funnel method" has proved most satisfactory, according to Lynn L. Smith, project manager. This method is very simple. Trucks or wagons are equipped with funnels which are bolted to the frames in such a manner that the chunks of sod are dropped just in front of the rear wheels so the wheels will run over them. The success of this method is no doubt due to the firm contact each chunk makes with the soil when it is run over by the wheels of the truck or wagon, Mr. Smith says. Observations made on farms of co-operators previous to the use of this method of sodding showed that poor survival of sod was usually caused by failure to set the chunks in such a way as to establish a firm contact with the soil moisture.

Proper cutting of the sod chunks is an important factor, according to Mr. Smith. The plan followed at Forrest City is to provide 1 x 12 foot side boards and have the chunks placed on the boards. The chunks should be spaded through so as to cut the pieces into squares of approximately 3 inches. The sod is then dumped onto the wagon or truck beds. Unloading crews consist of three, four or five men. One man sits near each spout and throws the chunks through the funnels. The other men are needed to keep the chunks in reach of those feeding the funnels. Where gullies exist they should be plowed in and seeded before the sodding crew arrives. Then the truck or wagon is driven very slowly across the gullies so an extra amount of sod may be dropped.

CCC boys from the Forrest City camp have sodded 1,400 acres to Bermuda grass by the funnel sodding method and the cost has been very low with exceptionally good survival results, Mr. Smith states. Other Soil Conservation Service projects and camps have also used this method of sodding with excellent results.

—Harold G. Anthony, Texas

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Ram Trucks

AT least 3,000 purebred rams have been distributed by the Michigan Purebred Sheep Breeders' Association in the eleven years it has operated a ram truck, according to E. L. Benson, animal husbandry extension specialist at Michigan State College. Only ten rams were sold the first year, but in later years, the number has run over the 500 mark.

The program of the Michigan association is typical of that carried on by several Midwest states. Upon payment of $1, a sheep breeder can become a member of the association and consign his surplus or used rams of good type and condition to the ram truck.

Each Monday morning, during a six-weeks' period, the truck leaves Michigan State College with up to 80 rams. Accompanying it are E. L. Benson and Bert Hoben, a lamb-grader for the Detroit Livestock Exchange, who give demonstrations on management and grading at the various stops.

After the demonstrations, the rams are sold to interested buyers at whatever price has been set by the consignor plus $5 to take care of the expenses of trucking, feed, and miscellany. Only Shropshires, Oxfords, and Hampshires are regularly carried, but other breeds may be had by ordering them thru the office of the Michigan College extension service.

Sheepmen who have purchased rams have the privilege of trading an animal in after finishing with him, providing he is in good condition and free of external parasites, animals so taken being valued at existing market prices.

"As a method of spreading the influence of good purebred rams, ram trucks seem unexcelled," says Benson. In regions where very few purebreds are produced or where new bloodlines are needed, the transportation of rams to that area has proved to be a service of considerable value.

—*Successful Farming*

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